ABSTRACTS

LUMBAR SPINE

LBP and impact on breathing and visceral function

Clin J Pain. 2014 Feb;30(2):162-7. doi: 10.1097/AJP.0b013e31828b10fe.

The relationship between incontinence, breathing disorders, gastrointestinal symptoms, and back pain in women: a longitudinal cohort study.

Smith MD, Russell A, Hodges PW.
Author information

Abstract

OBJECTIVES:
Recent studies suggest a relationship between incontinence, respiratory disorders, gastrointestinal (GI) symptoms, and back pain (BP). However, causality is difficult to infer. This longitudinal study aimed to determine whether the presence or development of one disorder increases risk for the development of another.

METHODS:
Women from the Australian Longitudinal Study on Women's Health were divided into subgroups; those with no BP (n=7259), no incontinence (n=18,480), no breathing problems (including allergy) (n=15,096), and no GI symptoms (n=17,623). Each subgroup was analyzed to determine the relationship between the development of the absent condition and the presence or development of the other conditions. Factors with a previously identified relationship with BP were included in analysis.

RESULTS:
Women with pre-existing and/or newly developed incontinence (prevalence ratios [PR]: 1.26 to 2.12) and breathing problems (PR: 1.38 to 2.11) had an increased risk for the development of BP, and women with pre-existing and newly developed BP were more likely to develop incontinence and breathing problems (PR: 1.18 to 2.44 and 1.53 to 2.62, respectively). The presence of GI symptoms was also identified as a risk factor for the development of these conditions.

DISCUSSION:
This study provides evidence of a relationship between BP, incontinence, respiratory problems, and GI symptoms in which the presence of one symptom is associated with the development of another. This suggests that common factors may contribute to the development of symptoms across this range of conditions.

PMID: 23486234

Obesity/activity and LBP

Spine J. 2014 Feb 1;14(2):209-16. doi: 10.1016/j.spinee.2013.11.010. Epub 2013 Nov 12.

Does physical activity influence the relationship between low back pain and obesity?

Smuck M1, Kao MC2, Brar N3, Martinez-Ith A3, Choi J3, Tomkins-Lane CC4.
Author information

Abstract

BACKGROUND CONTEXT:
Evidence supporting an association between obesity and low back pain (LBP) continues to grow; yet little is known about the cause and effect of this relationship. Even less is known about the mechanisms linking the two. Physical activity is a logical suspect, but no study has demonstrated its role.

PURPOSE:
This study was designed to examine the interrelationship between physical activity, obesity, and LBP. The specific aims were to determine if obesity is a risk factor for LBP in the U.S. population, measure the strength of any observed association, and evaluate the role of physical activity in modulating this association.

STUDY DESIGN/SETTING: A cross-sectional U.S. population-based study. **PATIENT SAMPLE:** A cohort of 6,796 adults from the 2003-2004 National Health and Nutrition Examination Survey.
OUTCOME MEASURES: Demographic information, an in-depth health questionnaire, physical examination details, and 7-day free-living physical activity monitoring using accelerometry (ActiGraph AM-7164; ActiGraph, Pensacola, FL, USA).
METHODS: LBP status was determined by questionnaire response. Body mass index (BMI) was calculated during physical examination and divided here into four groups (normal weight <25, overweight 25-30, obese 31-35, and ultraobese 36+). Summary measures of physical activity were computed based on intensity cutoffs, percentile intensities, and bout. Demographics, social history, and comorbid health conditions were used to build adjusted weighted logistic regression models constructed using Akaike Information Criterion. All displayed estimates are significant at level <.05. No external funding was received to support this study. None of the authors report conflicts of interest directly related to the specific subject matter of this manuscript.
RESULTS: In the U.S. population, the risk of low LBP increases in step with BMI from 2.9% for normal BMI (20-25) to 5.2% for overweight (26-30), 7.7% for obese (31-35), and 11.6% for ultraobese (36+). Smoking is consistently the strongest predictor of LBP across the BMI spectrum (odds ratio 1.6-2.9). Physical activity also modulates these risks. In the overall model, the best physical activity predictors of LBP are in the moderate and high intensity ranges with small effects (odds ratio 0.98 and 0.996 per standard deviation increase, respectively). When broken down by BMI, time spent in sedentary and moderate activity ranges demonstrate more robust influences on LBP status in the overweight, obese, and ultraobese groups.
CONCLUSIONS:
Increased BMI is a risk factor for back pain in Americans. More important, the role of physical activity in mitigating back pain risk is shown to be of greater consequence in the overweight and obese populations.

 KEYWORDS: Accelerometry, Body mass index, Low back pain, Musculoskeletal diseases, NHANES, Obesity, Physical activity PMID: 24239800

Stenosis rehabilitation

Cochrane Database Syst Rev. 2013 Dec 9;12:CD009644. doi: 10.1002/14651858.CD009644.pub2.

Rehabilitation following surgery for lumbar spinal stenosis.

McGregor AH, Probyn K, Cro S, Doré CJ, Burton AK, Balagué F, Pincus T, Fairbank J.

BACKGROUND: Lumbar spinal stenosis is a common cause of back pain that can also give rise to pain in the buttock, thigh or leg, particularly when walking. Several possible treatments are available, of which surgery appears to be best at restoring function and reducing pain. Surgical outcome is not ideal, and a sizeable proportion of patients do not regain good function. No accepted evidence-based approach to postoperative care is known-a fact thathas prompted this review.

OBJECTIVES: To determine whether active rehabilitation programmes following primary surgery for lumbar spinal stenosis have an impact on functional outcomes and whether such programmes are superior to 'usual postoperative care'.

SEARCH METHODS: We searched the following databases from their first issues to March 2013: CENTRAL (The Cochrane Library, most recent issue), the Cochrane Back Review Group Trials Register, MEDLINE, EMBASE, CINAHL and PEDro.**SELECTION CRITERIA:** We considered randomised controlled trials (RCTs) that compared the effectiveness of active rehabilitation versus usual care in adults (> 18 years of age) with confirmed lumbar spinal stenosis who had undergone spinal decompressive surgery (with or without fusion) for the first time. **DATA COLLECTION AND ANALYSIS:**Two review authors independently extracted data from the included trials by using a predeveloped form. We contacted authors of original trials to request additional unpublished data as required. We recorded baseline characteristics of participants, interventions, comparisons, follow-up and outcome measures to enable assessment of clinical homogeneity. Clinical relevance was independently assessed by using the five questions recommended by the Cochrane Back Review Group (CBRG), and risk of bias within studies was determined by using CBRG criteria.We pooled individual study results in a meta-analysis when appropriate. For continuous outcomes, we calculated the mean difference (MD) when the same measurement scales were used in all studies and the standardised mean difference (SMD) when different measurement scales were used. Whenreported means and standard deviations of the outcomes showed that outcome data were skewed, we log-transformed data for all studies in the comparison and performed a meta-analysis on the log-scale. Results of analyses performed on the log-scale were converted back to the original scale. We used a fixed-effect inverse variance model to measure treatment effect when no substantial evidence of statistical heterogeneity was found. When we detected substantial statistical heterogeneity, we used a random-effects inverse variance model.The primary outcome measure was functional status as measured by a back-specific functional scale. Secondary outcomes included measures of leg pain, low back pain and global improvement/general health. We considered statistical significance and clinical relevance of outcomes. We used the GRADE approach to assess the overall quality of evidence for each outcome on the basis of five criteria, for which evidence was ranked from high to very low quality, depending on the number of criteria met.

MAIN RESULTS: Our searches yielded 1,726 results, and a total of three studies (N = 373 participants) were included in the review and meta-analysis. All studies were deemed to have low risk of bias; no study had unacceptably high dropout rates. Also, no unacceptably unbalanced dropout rates, unacceptably low adherence rates or non-adherence to the protocol or clearly significant unbalanced baseline differences were noted for the primary outcome. Outcomes in the short term (within six months postoperative)Evidence of moderate quality from three RCTs (N = 340) shows that active rehabilitation is more effective than usual care for

functional status (log SMD -0.22, 95% confidence interval (CI) -0.44 to 0.00, corresponding to an average percentage improvement (reduction in standardised functional score) of 20%, 95% CI 0% to 36%) and for reported low back pain (log MD -0.18, 95% CI-0.35 to -0.02, corresponding to an average percentage improvement (reduction in VAS score) of 16%, 95% CI 2% to 30%). In contrast, evidence of low quality suggests that rehabilitation is no more effective than usual care for leg pain (log MD -0.17, 95% CI -0.52 to 0.19, corresponding to an average percentage improvement (reduction in VAS score) of 16%, 95% CI 21% worsening to 41% improvement). Low-quality evidence from two RCTs (N = 238) indicates that rehabilitation has no additional benefit on general health status as compared to usual care (MD 1.30, 95% CI -4.45 to 7.06). Outcomes in the long term (at 12 months postoperative)Evidence of moderate quality from three RCTs (N = 373) shows that rehabilitation is more effective than usual care for functional status (log SMD -0.26, 95% CI -0.46 to -0.05, corresponding to an average percentage improvement (reduction in standardised functional score) of 23%, 95% CI 5% to 37%), for reported low back pain (log MD -0.20, 95% CI -0.36 to -0.05, corresponding to an average percentage improvement (reduction in VAS score) of 18%, 95% CI 5% to 30%]. Evidence of moderate quality (N = 373) and for leg pain (log MD -0.24, 95% CI -0.47 to -0.01, corresponding to an average percentage improvement (reduction in VAS score) of 21%, 95% CI 1% to 37%). In contrast, evidence of low quality from two studies (N = 273) suggests that rehabilitation is no more effective than usual care with respect to improvement in general health (MD -0.48, 95% CI -6.41 to 5.4).None of the included papers reported any relevant adverse events.

AUTHORS' CONCLUSIONS: Evidence suggests that active rehabilitation is more effective than usual care in improving both short- and long-term (back-related) functional status. Similar findings were noted for secondary outcomes, including short-term improvement in low back pain and long-term improvement in both low back pain and leg pain, although limited impact was observed in relation to improvements in general health status. The clinical relevance of these effects is medium to small. Our evaluation is limited by the small number of relevant studies identified, and further research is required.

PMID: 24323844

Measurements of spinal ROM

Spine J. 2014 Feb 1;14(2):274-81. doi: 10.1016/j.spinee.2013.10.048. Epub 2013 Nov 13.

Reliability of computer-assisted lumbar intervertebral measurements using a novel vertebral motion analysis system.

Yeager MS1, Cook DJ1, Cheng BC2.
Author information

Abstract

BACKGROUND CONTEXT:
Traditional methods for the evaluation of in vivo spine kinematics introduce significant measurement variability. Digital videofluoroscopic techniques coupled with computer-assisted measurements have been shown to reduce such error, as well as provide detailed information about spinal motion otherwise unobtainable by standard roentgenograms. Studies have evaluated the precision of computer-assisted fluoroscopic measurements; however, a formal clinical evaluation and comparison with manual methods is unavailable. Further, it is essential to establish reliability of novel measurements systems compared with standard techniques.

PURPOSE:
To determine the repeatability and reproducibility of sagittal lumbar intervertebral measurements using a new system for the evaluation of lumbar spine motion.

STUDY DESIGN: Reliability evaluation of digitized manual versus computer-assisted measurements of the lumbar spine using motion sequences from a videofluoroscopic technique.

PATIENT SAMPLE:
A total of 205 intervertebral levels from 61 patients were retrospectively evaluated in this study.

OUTCOME MEASURES:
Coefficient of repeatability (CR), limits of agreement (LOA), intraclass correlation coefficient (ICC; type 3,1), and standard error of measurement.

METHODS:
Intervertebral rotations and translations (IVR and IVT) were each measured twice by three physicians using the KineGraph vertebral motion analysis (VMA) system and twice by three different physicians using a digitized manual technique. Each observer evaluated all images independently. Intra- and interobserver statistics were compiled based on the methods of Bland-Altman (CR, LOA) and Shrout-Fleiss (ICC, standard error of measurement).

RESULTS:
The VMA measurements demonstrated substantially more precision compared with the manual technique. Intraobserver measurements were the most reliable, with a CR of 1.53 (manual, 8.28) for IVR, and 2.20 (manual, 11.75) for IVT. The least reliable measurements were interobserver IVR and IVT, with a CR of 2.15 (manual, 9.88) and 3.90 (manual, 12.43), respectively. The ICCs and standard error results followed the same pattern.

CONCLUSIONS:
The VMA system markedly reduced variability of lumbar intervertebral measurements compared with a digitized manual analysis. Further, computer-assisted fluoroscopic imaging techniques demonstrate precision within the range of computer-assisted X-ray analysis techniques.

KEYWORDS: Computer assisted, Intervertebral measurement, Lumbar, Reliability, Vertebral motion analysis, Videofluoroscopy PMID: 24239805

LBP/opioid use and cognitive function

Evidence of specific cognitive deficits in patients with chronic low back pain under long-term substitution treatment of opioids *Full Text* □

Pain Physician, 01/24/2014 **Evidence Based Medicine** **Review Article**
Schiltenwolf M, et al. –

BACKGROUND: There is a growing number of patients worldwide being treated with long-term opioids for chronic non-cancer pain, although there is limited evidence for their effectiveness in improving pain and function. Opioid-use related adverse effects, especially in cognitive functioning in these patients, are rarely evaluated.

OBJECTIVES: The present study investigated the cognitive functions of patients with chronic back pain who underwent long-term opioid treatment in comparison with those patients without opioid usage and healthy controls.

STUDY DESIGN: A prospective, nonrandomized, cross-sectional study.

SETTING: Multidisciplinary pain management clinic, specialty referral center, University Hospital in Germany.

METHODS: In a prospective cross-sectional design, 37 patients with chronic back pain who underwent long-term opioid therapy (OP) were compared with 33 patients with chronic back pain without opioid therapy (NO) and 25 healthy controls (HC). Assessment of primary outcome included cognitive function such as information processing speed, choice reaction time, pattern recognition memory, and executive function. Other data included pain, back function, depression and anxiety, use of medication, and education status. The relationship between cognitive functions and anxiety/depression was analysed.

RESULTS: Both patient groups needed significantly longer time in information processing when compared to HC (Group 1: 41.87 ± 20.47 Group 2: 38.29 ± 19.99 Group 3: 30.25 ± 14.19). Additionally, OP patients had significantly reduced spatial memory capacity, flexibility for concept change, and impaired performance in working memory assessment compared to NO patients and HC. The impaired cognitive outcomes were significantly associated with pain intensity, depression scores, and medication use.

LIMITATIONS: Limitations include small number of patients with heterogeneous opioid therapy and the nonrandomized observational nature of the study.

CONCLUSIONS: Our findings give a differential view into the cognitive changes from chronic back pain with and without long-term opioids treatment. Chronic back pain itself impairs some distinct cognitive functions. Long-term opioid therapy adds further cognitive impairment.

Malformations

Surg Radiol Anat. 2013 Dec 27.

Developmental malformations in the area of the lumbosacral transitional vertebrae and sacrum: differences in gender and left/right distribution.

Dzupa V, Slepanek M, Striz M, Krbec M, Chmelova J, Kachlik D, Baca V.
Author information

Abstract

PURPOSE:
The aim of this study was to determine the incidence of congenital malformations of the lumbosacral transitional vertebrae in the general population, and the differences in their gender and left/right distributions.

METHODS:
The examined group comprised of all patients who underwent a pelvic X-ray during 2010 for any reason. The observed parameters included the following malformations: the presence of megatransversus at L5; sacralization of L5 or L6; a S1 lumbarization; the presence of six sacral vertebrae; or spina bifida at the level of L5, S1 or S2. In cases of megatransversus at L5, the lateral distribution was recorded. A total of 1,513 images were evaluated. Sex and lateral differences were evaluated using the Pearson's (χ 2) test with a significance level of 5 %.

RESULTS AND CONCLUSIONS:
A total of 478 malformations were found in 417 patients, which constituted 27.6 % of the entire group. Malformations occurred in 250 women (25.4 % of all women) and 167 men (31.6 % of all men) and the female to male ratio in affected individuals was 1.5:1. The predominance of the occurrence of malformations observed in men was statistically significant ($p = 0.009$). The most frequently occurring malformations were the presence of six sacral vertebrae (179 patients) and megatransversus at L5 (150 patients). The study confirmed a high incidence of congenital malformations in the area of the lumbosacral transitional vertebrae and demonstrated a higher incidence in males. Unilaterally occurring megatransversus at L5 was significantly more common on the left side.

PMID: 24370578

Predictions of LBP

Chiropr Man Therap. 2014 Jan 9;22(1):1.

Absence of low back pain in the general population followed fortnightly over one year with automated text messages.

Leboeuf-Yde C, Lemeunier N, Wedderkopp N, Kjaer P.

Abstract

BACKGROUND:

Over one year, the majority of patients with low back pain (LBP) from the secondary care sector could not report a single week without LBP and few could report a non-episode, defined as at least one month without LBP. Presumably, non-episodes would be more common in the general population. The aim of this study was to assess the usefulness of this definition of "non-episodes", by studying their presence over one year in the general population. Specifically, we wanted to: 1) determine the prevalence of non-episodes, 2) identify the proportion of study participants who could be classified as being in a non-episode at the end of the observation period, and 3) estimate the proportion of participants classified as having at least two separate non-episodes METHODS: Danes, aged 49/50, who previously participated in a population-based study on LBP received fortnightly automated text (SMS) messages over one year. Each time, participants reported the number of days with LBP in the preceding fortnight. Fortnights with 0 days of LBP were defined as 'zero-fortnights' and two such fortnights in a row (one month) were defined as a 'non-episode'. Estimates are reported as percentages with their 95% confidence intervals in brackets.

RESULTS:

Two hundred and ninety-three people were invited to participate. Of these, 16 declined participation and 16 were excluded because they failed to return their text message at least 20 of the 26 times, leaving 261 in the current analyses. Of these, 11% (2-22) never reported a zero-fortnight. In all, 83% (78-88) had at least one non-episode throughout the study period and the proportion of participants classified as being in a non-episode at the end of the study was 59% (53-65). The percentage of individuals with at least two non-episodes was 52% (46-58).

CONCLUSIONS:

It is possible to differentiate people from the general population as having or not having episodes of LBP using the definition of absence of LBP over one month as the measure. Non-episodes were far more common in the general population than in the secondary care sector, suggesting it to be a potentially useful definition in research.

PMID: 24405834

Electrotherapy and LBP

Phys Ther. 2014 Jan 23.

Enhanced Therapeutic Alliance Modulates Pain Intensity and Muscle Pain Sensitivity in Patients With Chronic Low Back Pain: An Experimental Controlled Study.

Fuentes J, Armijo-Olivo S, Funabashi M, Miciak M, Dick B, Warren S, Rashiq S, Magee DJ, Gross DP.

Abstract

Background

Physical therapy influences chronic pain by means of the specific ingredient of an intervention as well as contextual factors including the setting and therapeutic alliance (TA) between provider and patient.

Objective

The purpose of this study was to compare the effect of enhanced versus limited TA on pain intensity and muscle pain sensitivity in patients with chronic low back pain (CLBP) receiving either active or sham interferential current therapy (IFC).

Design

An experimental controlled study with repeated measures was conducted. Participants were randomly divided into 4 groups: (1) AL (n=30), which included the application of active IFC combined with a limited TA; (2) SL (n=29), which received sham IFC combined with a limited TA; (3) AE (n=29) which received active IFC combined with an enhanced TA; and (4) SE (n=29), which received sham IFC combined with an enhanced TA.

Methods One hundred seventeen individuals with CLBP received a single session of active or sham IFC. Measurements included pain intensity as assessed with a numerical rating scale (PI-NRS) and muscle pain sensitivity as assessed via pressure pain threshold (PPT).

Results Mean differences on the PI-NRS were 1.83 cm (95% CI=14.3-20.3), 1.03 cm (95% CI=6.6-12.7), 3.13 cm (95% CI=27.2-33.3), and 2.22 cm (95% CI=18.9-25.0) for the AL, SL, AE, and SE groups, respectively. Mean differences on PPTs were 1.2 kg (95% CI=0.7-1.6), 0.3 kg (95% CI=0.2-0.8), 2.0 kg (95% CI=1.6-2.5), and 1.7 kg (95% CI=1.3-2.1), for the AL, SL, AE, and SE groups, respectively.

Limitations

The study protocol aimed to test the immediate effect of the TA within a clinical laboratory setting.

Conclusions The context in which physical therapy interventions are offered has the potential to dramatically improve therapeutic effects. Enhanced TA combined with active IFC appears to lead to clinically meaningful improvements in outcomes when treating patients with CLBP.

PMID: 2430961

Progression of CLBP

BMJ Open. 2013 Dec 11;3(12):e003838. doi: 10.1136/bmjopen-2013-003838.

Long-term trajectories of back pain: cohort study with 7-year follow-up.

Dunn KM, Campbell P, Jordan KP.
Author information

Abstract

OBJECTIVE:
To describe long-term trajectories of back pain.

DESIGN:
Monthly data collection for 6 months at 7-year follow-up of participants in a prospective cohort study.

SETTING:
Primary care practices in Staffordshire, UK.

PARTICIPANTS:
228 people consulting their general practitioners with back pain, on whom information on 6-month back pain trajectories had been collected during 2001-2003, and who had valid consent and contact details in 2009-2010, were contacted. 155 participants (68% of those contacted) responded and provided sufficient data for primary analyses.

OUTCOME MEASURES:
Trajectories based on patients' self-reports of back pain were identified using longitudinal latent class analysis. Trajectories were characterised using information on disability, psychological status and presence of other symptoms.

RESULTS:
Four clusters with different back pain trajectories at follow-up were identified: (1) no or occasional pain, (2) persistent mild pain, (3) fluctuating pain and (4) persistent severe pain. Trajectory clusters differed significantly from each other in terms of disability, psychological status and other symptoms. Most participants remained in a similar trajectory as 7 years previously (weighted κ 0.54; 95% CI 0.42 to 0.65).

CONCLUSIONS:
Most people with back pain appear to follow a particular pain trajectory over long time periods, and do not have frequently recurring or widely fluctuating patterns. The results are limited by lack of information about the time between data collection periods and by loss to follow-up. However, findings do raise questions about standard divisions into acute and chronic back pain. A new framework for understanding the course of back pain is proposed.

KEYWORDS: Epidemiology, Primary Care, Rheumatology PMID: 24334157

Inflammatory LBP

The mechanical and inflammatory low back pain (MIL) index: development and validation
Full Text

BMC Musculoskeletal Disorders, 01/10/2014 **Evidence Based Medicine Clinical Article**

Cuesta–Vargas A, et al

Background
The purpose of this study was the development of a valid and reliable "Mechanical and Inflammatory Low Back Pain Index" (MIL) for assessment of non-specific low back pain (NSLBP). This 7-item tool assists practitioners in determining whether symptoms are predominantly mechanical or inflammatory.

Methods
Participants (n = 170, 96 females, age = 38 +/- 14 years-old) with NSLP were referred to two Spanish physiotherapy clinics and completed the MIL and the following measures: the Roland Morris Questionnaire (RMQ), SF-12 and "Backache Index" (BAI) physical assessment test. For test-retest reliability, 37 consecutive patients were assessed at baseline and three days later during a non-treatment period. Face and content validity, practical characteristics, factor analysis, internal consistency, discriminant validity and convergent validity were assessed from the full sample.

Results
A total of 27 potential items that had been identified for inclusion were subsequently reduced to 11 by an expert panel. Four items were then removed due to cross-loading under confirmatory factor analysis where a two-factor model yielded a good fit to the data (chi2 = 14.80, df = 13, p = 0.37, CFI = 0.98, and RMSEA = 0.029). The internal consistency was moderate (alpha = 0.68 for MLBP; 0.72 for ILBP), test-retest reliability high (ICC = 0.91; 95%CI = 0.88-0.93) and discriminant validity good for either MLBP (AUC = 0.74) and ILBP (AUC = 0.92). Convergent validity was demonstrated through similar but weak correlations between the ILBP and both the RMQ and BAI (r = 0.34, p < 0.001) and the MLBP and BAI (r = 0.38, p < 0.001).

Conclusions
The MIL is a valid and reliable clinical tool for patients with NSLBP that discriminates between mechanical and inflammatory LBP

Catastrophizing and LBP

Spine (Phila Pa 1976). 2013 Nov 18.

The Influence of Catastrophizing on Treatment Outcome in Patients With Non-Specific Low Back Pain: A Systematic Review.

Wertli MM, Burgstaller JM, Weiser S, Steurer J, Kofmehl R, Held U.

Abstract

Study Design. Systematic review

Objective. The aim of the current study was to assess the effect of catastrophizing on treatment efficacy and outcome in patients treated for low back pain.

Summary of Background Data. Psychological factors including catastrophizing thoughts are believed to increase the risk for chronic low back pain. The influence of catastrophizing is debated.

Methods. In September 2012 the following databases were searched: BIOSIS, CINAHL, Cochrane Library, Embase, OTSeeker, PeDRO, PsycInfo, Medline, Scopus, and Web of Science. For 50 of 706 references full text was assessed. Results based on 11 studies were included in this analysis.

Results. In 11 studies, a total of 2,269 patients were included. Seven studies were of good and four of moderate methodological quality. Heterogeneity in study settings, treatments, outcomes, and patient populations impeded meta-analysis. Catastrophizing at baseline was predictive for disability at follow-up in four studies and for pain in two studies. Three studies found no predictive effect of catastrophizing. A mediating effect was found in all studies (n = 5) assessing the impact of a decrease in catastrophizing during treatment. A greater decrease was associated with better outcome. Most studies that investigated the moderating effects on treatment efficacy found no effect (n = 5). However, most studies did not look for a direct interaction between the treatment and catastrophizing thoughts. No study investigated the influence of catastrophizing on work-related outcomes including return to work.

Conclusion. Catastrophizing predicted degree of pain and disability and mediated treatment efficacy in most studies. The presence of catastrophizing should be considered in patients with persisting back pain. Limited evidence was found for the moderating effects on treatment efficacy. Future research should aim to clarify the role of catastrophizing as a moderator of outcome and investigate its importance for work-related outcomes.

PMID: 24253796

McKenzie classification system

Spine (Phila Pa 1976). 2013 Nov 18. [Epub ahead of print]

McKenzie Lumbar Classification: Inter-Rater Agreement by Physical Therapists with Different Levels of Formal McKenzie Post-Graduate Training.

Werneke MW, Deutscher D, Hart DL, Stratford P, Ladin J, Weinberg J, Herbowy S, Resnik L.

Abstract

Study Design. Inter-rater chance-corrected agreement study

Objective. The aim was to examine the association between therapists' level of formal pre-credential McKenzie post-graduate training and agreement on the following McKenzie classification variables for patients with low back pain (LBP): main McKenzie syndromes, presence of lateral shift, derangement reducibility, directional preference and centralization.

Summary of Background Data. Minimal level of McKenzie post graduate training needed to achieve acceptable agreement of McKenzie classification system is unknown.

Methods. Raters (N = 47) completed multiple sets of 2 independent successive examinations at 3 different stages of McKenzie post-graduate training (levels Part A&B, Part C, and Part D). Agreement was assessed with kappa coefficients and associated 95% confidence intervals (CIs). A minimum kappa threshold of 0.60 was used as a pre-determined criterion for level of agreement acceptable for clinical use.

Results. Raters examined 1,662 patients (mean age = 51 ± 15, Min, Max: 18 to 91, 57% women). Data distributions were not even and were highly skewed for all classification variables. No training level studied had acceptable agreement for any McKenzie classification variable. Agreements for all levels of McKenzie post-graduate training were higher than expected by chance for most of the classification variables except Part A&B training level for judging lateral shift and centralization and Part D training level for judging reducibility. Agreement between training levels Part A&B, Part C, and Part D were similar with overlapping 95% CIs.

Conclusion. Results indicate that level of inter-rater chance corrected agreement of McKenzie classification system was not acceptable for therapists at any level of formal McKenzie post graduate training. This finding raises concerns about the clinical utility of the McKenzie classification system at these training levels. Additional studies are needed to assess agreement levels for therapists who receive additional training or experience at the McKenzie credentialed or diploma levels.

PMID: 24253786

Food intack in CLBP

Pain. 2013 Dec 30. pii: S0304-3959(13)00690-8. doi: 10.1016/j.pain.2013.12.027.

Decreased food pleasure and disrupted satiety signals in chronic low-back pain.

Geha P1, Dearaujo IE2, Green B3, Small DM2.
Author information

Abstract

Chronic low-back pain (CLBP) and obesity are interrelated but the physiological mechanisms linking the two conditions remain to be determined. Functional brain imaging data from CLBP patients show functional and structural alterations in areas mediating the attribution of hedonic value to food.

Accordingly, we hypothesized that CLBP patients would exhibit alteration in the hedonic perception of highly palatable, calorie-containing foods. CLBP patients and matched healthy controls initially rated their perception of highly palatable puddings of varying fat content and sugary drinks of varying sucrose content without ingesting significant amounts of either stimulus. In a subsequent intake test, hungry participants ingested their preferred pudding ad libitum. Compared to healthy controls, CLBP patients exhibited significantly lower ratings of food pleasure when sampling the fat puddings, but not when sampling the sugary drinks. In contrast, the patients' sensory evaluation of these stimuli was not different from those of healthy controls. In addition, while in healthy controls the hedonic ratings of pudding closely matched caloric intake and decreased hunger after ad libitum pudding intake, such effect was totally abolished in CLBP patients.

Our data thus reveal a decoupling between hedonic perception and fat calorie intake in CLBP patents, and suggest altered hedonic perception of fat as a potential mechanism linking CLBP to overeating and obesity.

KEYWORDS: Chronic back pain, Obesity, Pleasure, Satiety PMID: 24384160

Impact of LBP

Arch Phys Med Rehabil. 2014 Jan 21. pii: S0003-9993(14)00031-8. doi: 10.1016/j.apmr.2013.10.032.

The Incidence, Prevalence, Costs and Impact on Disability of Common Conditions Requiring Rehabilitation in the US: Stroke, Spinal Cord Injury, Traumatic Brain Injury, Multiple Sclerosis, Osteoarthritis, Rheumatoid Arthritis, Limb Loss, and Back Pain.

Ma VY[1], Chan L[2], Carruthers KJ[1].
Author information

Abstract

OBJECTIVE:
To determine the relative incidence, prevalence, costs and impact on disability of 8 common conditions treated by rehabilitation professionals.

DESIGN:
Structured review of the literature SETTING: United States PARTICIPANTS: N/A INTERVENTIONS: N/A MAIN OUTCOME MEASURES: disease associated incidence, prevalence, direct and indirect costs and impact on activity and work limitations.

RESULTS:
Back pain and arthritis (osteoarthritis and rheumatoid arthritis) are the most common and costly conditions that we examined, affecting over 100 million individuals and costing over $200 billion per year. Traumatic brain injury, while less common than arthritis and back pain, carries enormous per capita direct and indirect costs, mostly due to the young age of those involved and the severe disability that it may cause. Finally, stroke, which is often listed as the most common cause of disability, is likely second to both arthritis and back pain in its impact on functional limitations.

CONCLUSIONS:
Of the common rehabilitation diagnoses we studied, musculoskeletal conditions such and back pain and arthritis likely have the most impact on the health care system due to their high prevalence and impact on disability.

KEYWORDS:
Incidence, back pain, direct costs, disability, indirect costs, limb loss, multiple sclerosis, osteoarthritis, prevalence, rheumatoid arthritis, spinal cord injury, stroke, traumatic brain injury
PMID: 24462839

Use of antibiotics

Surg Neurol Int. 2013; 4(Suppl 5): S373–S374. Published online 2013 October 29.doi: 10.4103/2152-7806.120780 PMCID: PMC3841939

Editorial on two chronic low back pain studies: A major change in surgical management of disc disease?

Ron Pawl*

In two recent publications, the authors' hypothesis was that Modic type 1 changes seen in patients with chronic low back pain and herniated lumbar discs may be attributed to bacterial infection/inflammation. The first study showed that many herniated discs were infected with Proprionibacterium acnes, a common anaerobic skin organism, also found in sarcoidosis, and possibly, arthritic joints. In the second double-blind randomized study, 162 patients with disc herniation and Modic type 1 changes were treated with 100 days of oral Bioclavid (Amoxicillin/Clavulanic acid) vs. placebo; those treated with antibiotics improved in all dimensions (e.g., reduced chronic low back/leg pain, reduced disability). Together, the implications of these studies for spine surgeons and pain practitioners are momentous. If a few weeks of oral antibiotic treatment resolves chronic low back pain, then much currently performed spine surgery (e.g. including internal fixation/fusion), as well as chronic pain management/rehabilitation and psychological strategies may be rendered unnecessary.

Keywords: Disc disease, infection, Modic type I changes, nonsurgical, spine

FIRST STUDY

Earlier this year, two papers by authors from Denmark published in the European Spine Journal might well be harbingers of change in the diagnosis and treatment of chronic low back pain.[1,2] In the first paper, the authors point out that a previous work demonstrated discs removed under strict sterile precautions during surgery for disc herniation were infected with Proprionibacterium.[2,5] They postulated a relationship between disc infection and the development of Modic type I changes (MC). Of the 61 patients undergoing surgery for extruded disc herniation in their series, 46% of specimens grew acnes (Proprionibacterium Acnes [PA]), and this correlated with a greater frequency of MC. MC, therefore, likely reflected edema surrounding an infected disc (e.g., bacterium such as PA). PA is a common bacterium found on the skin and has been implicated in other conditions as well; acne vulgaris, sarcoidosis, and possibly osteoarthritis.[3,4]

SECOND STUDY

The second double-blind, randomized, controlled trial involved 162 patients with chronic low back pain due to herniated discs accompanied by bone edema (e.g., MC in the vertebral bodies) for over 6 months duration.[1] Patients were randomized to receive either 100 days of treatment with Bioclavid (Amoxicillin/Clavulanic acid) vs. placebo. Patients were then blindly evaluated at prior to treatment, after 100 days of treatment, and one year later (144 of the 162 patients). At one year the authors concluded ".(patients) who were treated with antibiotics obtained statistically significant improvements compared to the placebo group in all measured parameters, including: The primary outcome of disease-specific disability, back pain intensity, and the secondary outcomes of, leg pain intensity, general improvement, number of hours with pain, reduced number with chronic pain."

IMPLICATION OF LOW GRADE INFECTION VS. SPINAL SURGICAL LESION

If low grade infections are a significant cause of low back pain (and it does not take much to implicate the cervical spine as well) and a few weeks of antibiotic treatment solves much of the problem, then there will be a major reduction in internal fixation and fusion of the spine for chronic low back pain. That would be good for patients and significantly reduce medical costs, but would be bad economically for spine surgeons and some hospital services. Similarly, such patients successfully treated would not need the services of pain practitioners and pain rehabilitation services. Further questions regarding pain management

What then are the implications for the psychological findings in patients with chronic low back pain syndromes? Are such findings reactions to the pain? What does that mean regarding somatization, converting emotional distress into bodily complaints, considered the underlying phenomenon leading to chronic pain complaints and which is a mainstay finding in chronic back pain patients? These questions will need answers as well.

Changes in Lumbar activation in CLBP

Patients with low back pain demonstrate increased activity of the posterior oblique sling muscle during prone hip extension □

PM&R, 01/03/2014 **Clinical Article**

Kim JW, et al.

Abstract

Objectives

To examine activation patterns of the myofascial chain in women experiencing chronic low back pain (CLBP) and women without CLBP during a prone hip extension (PHE) test.

Design

Cross sectional.

Setting

Clinical research laboratory.

Participants

Fifteen women experiencing CLBP and 15 women without CLBP.

Methods

Surface electromyographic recordings from the posterior oblique sling during PHE.

Main outcome measurements

Two-sample t-tests were used to compare demographic information and electromyographic signal amplitude of the posterior oblique sling between groups.

Results

Women with CLBP exhibited significantly increased normalized electromyographic signal amplitudes in the contralateral latissimus dorsi ($p = 0.01$), contralateral elector spinae ($p < 0.01$), ipsilateral elector spinae ($p < 0.01$), ipsilateral gluteus maximus ($p = 0.03$), and ipsilateral biceps femoris ($p = 0.02$), compared to women without CLBP.

Conclusions

Women with CLBP had higher activity in the posterior oblique sling muscles than did women without CLBP during PHE. These findings suggest that an alteration can be made in the posterior oblique sling muscle activities during PHE in women with CLBP.

LBP/Disc

Disc degeneration vs. prolapse

Spine J. 2014 Feb 1;14(2):300-7. doi: 10.1016/j.spinee.2013.10.042. Epub 2013 Nov 12.

Patterns of lumbar disc degeneration are different in degenerative disc disease and disc prolapse magnetic resonance imaging analysis of 224 patients.

Kanna RM1, Shetty AP1, Rajasekaran S2.

BACKGROUND CONTEXT: Existing research on lumbar disc degeneration has remained inconclusive regarding its etiology, pathogenesis, symptomatology, prevention, and management. Degenerative disc disease (DDD) and disc prolapse (DP) are common diseases affecting the lumbar discs. Although they manifest clinically differently, existing studies on disc degeneration have included patients with both these features, leading to wide variations in observations. The possible relationship or disaffect between DDD and DP is not fully evaluated.
PURPOSE: To analyze the patterns of lumbar disc degeneration in patients with chronic back pain and DDD and those with acute DP.
STUDY DESIGN: Prospective, magnetic resonance imaging-based radiological study.
METHODS: Two groups of patients (aged 20-50 years) were prospectively studied. Group 1 included patients requiring a single level microdiscectomy for acute DP. Group 2 included patients with chronic low back pain and DDD. Discs were assessed by magnetic resonance imaging through Pfirmann grading, Schmorl nodes, Modic changes, and the total end-plate damage score for all the five lumbar discs.
RESULTS: Group 1 (DP) had 91 patients and group 2 (DDD) had 133 patients. DP and DDD patients differed significantly in the number, extent, and severity of degeneration. DDD patients had a significantly higher number of degenerated discs than DP patients (p<.000). The incidence of multilevel and pan-lumbar degeneration was also significantly higher in DDD group. The pattern of degeneration also differed in both the groups. DDD patients had predominant upper lumbar involvement, whereas DP patients had mainly lower lumbar degeneration. Modic changes were more common in DP patients, especially at the prolapsed level. Modic changes were present in 37% of prolapsed levels compared with 9.9% of normal discs (p<.00). The total end-plate damage score had a positive correlation with disc degeneration in both the groups. Further the mean total end-plate damage score at prolapsed level was also significantly higher.
CONCLUSION: The results suggest that patients with disc prolapse, and those with back pain with DDD are clinically and radiologically different groups of patients with varying patterns, severity, and extent of disc degeneration. This is the first study in literature to compare and identify significant differences in these two commonly encountered patient groups. In patients with single-level DP, the majority of the other discs are nondegenerate, the lower lumbar spine is predominantly involved and the end-plate damage is higher. Patients with back pain and DDD have larger number of degenerate discs, early multilevel degeneration, and predominant upper lumbar degeneration. The knowledge that these two groups of patients are different clinically and radiologically is critical for our improved understanding of the disease and for future studies on disc degeneration and disc prolapse.
 KEYWORDS: Disc degeneration, Disc prolapse, Magnetic resonance imaging, Patterns PMID: 24231779

Disc compression with Back pack in adolescents

Spine (Phila Pa 1976). 2013 Nov 18.

Altered Disc Compression in Children With Idiopathic Low Back Pain: An Upright MRI Backpack Study.

Shymon SJ, Yaszay B, Dwek JR, Proudfoot JA, Donohue M, Hargens AR.

Abstract

STRUCTURED ABSTRACT:

Study Design. This study is a repeated measures design to measure the lumbar spine's response to common backpack loads in children with idiopathic low back pain (ILBP) using upright MRI.

Objective. The purpose of this study is to analyze the lumbar spine's response to backpack loads with upright MRI in ILBP children in order to compare their results to previously published normal child data under the same conditions. We hypothesize that typical backpack loads will have a different effect on the lumbar spine of normal and ILBP children.

Summary of Background Data. Research in normal children shows that backpack loads compress the lumbar IVDs, increase lumbar coronal deformity, and increase pain.

Methods. Fifteen pediatric and adolescent patients with ILBP were selected. Patients were excluded if a spinal deformity, an underlying pathology, or known injury was identified. A 0.6T upright MRI scanner imaged the subjects while supine and standing wearing 0 kg, 4 kg, and 8kg backpacks. IVD height, lumbar lordosis, lumbar coronal deformity, and pain score were recorded after each condition and compared using ANOVAs. We compared the above variables between ILBP and normal subjects using generalized least squares models.

Results. The cohort's mean age was 13 ± 3 years. The 4kg and 8kg backpacks only compressed the L5-S1 IVD relative to upright with no load. Subjects experienced increasing pain with increasing load. Load had no effect on lumbar lordosis or lumbar coronal deformity. Compared to normal children, ILBP children experience significantly less disc compression at T12-L1 to L4-5, less lumbar lordosis, and more pain with increasing load.

Conclusions. In ILBP children, increasing backpack load compresses only the L5-S1 IVD. Compared to normal children, ILBP children experience less lumbar IVD compression, less lumbar lordosis, and more pain due to increasing load suggesting altered mechanisms for load tolerance in ILBP children.

PMID: 24253789

Mechanical stress and inflammation

Arthritis Res Ther. 2014 Jan 23;16(1):R21.

High mechanical strain of primary intervertebral disc cells promotes secretion of inflammatory factors associated with disc degeneration and pain.

Gawri R, Rosenzweig DH, Krock E, Ouellet JA, Stone LS, Quinn TM, Haglund L.

Abstract

INTRODUCTION:

Excessive mechanical loading of intervertebral discs (IVD) is thought to alter matrix properties and influence disc cell metabolism, contributing to degenerative disc disease and development of discogenic pain. However, little is known about how mechanical strain induces these changes. This study investigated the cellular and molecular changes as well as which inflammatory receptors and cytokines were up-regulated in human intervertebral disc cells exposed to high mechanical strain (HMS) at low frequency. The impact of these metabolic changes on neuronal differentiation was also explored to determine a role in the development of disc degeneration and discogenic pain.

METHODS:

Isolated human annulus fibrosus (AF) and nucleus pulposus (NP) cells were exposed to HMS (20% cyclical stretch at 0.001 Hz) on high-extension silicone rubber dishes coupled to a mechanical stretching apparatus and compared to static control cultures. Gene expression of toll-like receptors (TLR), neuronal growth factor (NGF) and tumor necrosis factor alpha (TNFalpha) was assessed. Collected conditioned media was analyzed for cytokine content and applied to rat pheocromocytoma PC12 cells for neuronal differentiation assessment.

RESULTS:

HMS caused up-regulation of TLR2, TLR4, NGF and TNFalpha gene expression in IVD cells. Medium from HMS cultures contained elevated levels of growth related oncogene, interleukin (IL)-6, IL-8, IL-15, monocyte chemoattractant protein (MCP)-1, MCP-3, monokine induced by gamma interferon, transforming growth factor beta-1, TNFalpha and NGF. Exposure of PC12 cells to HMS-conditioned media resulted in both increased neurite sprouting and cell death.

CONCLUSIONS:

HMS culture of IVD cells in vitro drives cytokine and inflammatory responses associated with degenerative disc disease and low back pain. This study provides evidence for a direct link between cellular strain, secretory factors, neo-innervation and potential degeneration and discogenic pain in vivo.

PMID: 24457003

End plate involvement post fusion

Spine J. 2014 Feb 1;14(2):225-33. doi: 10.1016/j.spinee.2013.08.058. Epub 2013 Nov 13.

Back pain's association with vertebral end-plate signal changes in sciatica.

El Barzouhi A1, Vleggeert-Lankamp CL2, van der Kallen BF3, Lycklama À Nijeholt GJ3, van den Hout WB4, Koes BW5, Peul WC6; Leiden–The Hague Spine Intervention Prognostic Study Group.

BACKGROUND CONTEXT:
Patients with sciatica frequently experience disabling back pain. One of the proposed causes for back pain is vertebral end-plate signal changes (VESC) as visualized by magnetic resonance imaging (MRI).

PURPOSE:
To report on VESC findings, changes of VESC findings over time, and the correlation between VESC and disabling back pain in patients with sciatica.

STUDY DESIGN/SETTING:
A randomized clinical trial with 1 year of follow-up.

PATIENTS SAMPLE:
Patients with 6 to 12 weeks of sciatica who participated in a multicenter, randomized clinical trial comparing an early surgery strategy with prolonged conservative care with surgery if needed.

OUTCOME MEASURES: Patients were assessed by means of the 100-mm visual analog scale (VAS) for back pain (with 0 representing no pain and 100 the worst pain ever experienced) at baseline and 1 year. Disabling back pain was defined as a VAS score of at least 40 mm.

METHODS:
Patients underwent MRI both at baseline and after 1 year follow-up. Presence and change of VESC was correlated with disabling back pain using chi-square tests and logistic regression analysis.

RESULTS:
At baseline, 39% of patients had disabling back pain. Of the patients with VESC at baseline, 40% had disabling back pain compared with 38% of the patients with no VESC (p=.67). The prevalence of type 1 VESC increased from 1% at baseline to 35% 1 year later in the surgical group compared with an increase from 3% to 11% in the conservative group. The prevalence of type 2 VESC decreased from 40% to 29% in the surgical group while remaining almost stable in the conservative group at 41%. The prevalence of disabling back pain at 1 year was 12% in patients with no VESC at 1 year, 16% in patients with type 1 VESC, 11% in patients with type 2 VESC, and 3% in patients with both types 1 and 2 VESC (p=.36). Undergoing surgery was associated with increase in the extent of VESC (odds ratio [OR], 8.6; 95% confidence interval [CI], 4.7-15.7; p<.001). Patients who showed an increase in the extent of VESC after 1 year did not significantly report more disabling back pain compared with patients who did not show any increase (OR, 1.2; 95% CI, 0.6-2.6; p=.61).

CONCLUSION:
In this study, undergoing surgery for sciatica was highly associated with the development of VESC after 1 year. However, in contrast with the intuitive feeling of spine specialists, those with and those without VESC reported disabling back pain in nearly the same proportion. Therefore, VESC does not seem to be responsible for disabling back pain in patients with sciatica.

 KEYWORDS: Conservative treatment, Low back pain, Sciatica, Surgery, Vertebral end-plate signal changes PMID: 24239802

Discs impact on pain

The Etiologies of Low Back Pain in Patients with Lumbar Disk Herniation

Mehdi Khajavi, Fariborz Samiei

Journal of Research in Medical Sciences, 01/09/2014 Clinical Article

Abstract

Background: Low back pain (LBP) is a common complaints in population which lower the quality of life. The main etiology of LBP is recognized just in about 20 % of patients, while in 80% of cases it has been attributed to lumbar disk herniation and causes some unnecessary lumbar surgeries without realizing the certain cause. Consequently, this study was planned to evaluate the etiologies of LBP in patients who had lumbar disc herniation to clarify whether the disc herniation is the main cause of patients` pain or other diseases rather than disc herniation are responsible for this kind of pain.

Materials and Methods: In this cross sectional study, we analyzed the medical profiles of the patients with proven lumbar disc herniation in a private clinic in Mashhad City, Iran between 2005 and 2012 for demographic and the etiologies of LBP with clinical and paraclinical studies. We also calculated the incidence of each etiology in aid of SPSS software (version 13).

Results: In our study, among 1250 patients with proven lumbar disc herniation by MRI, 500(40%) patients had chronic LBP, and the most common causes of LBP were heavy constant working (40.2%), Osteoporosis (35.6%) and Sacro-iliac joint pain (34.6%) respectively, and interestingly the lumbar disc herniation as the cause of their LBP was in 9th rate.

Conclusion: In this study we found that in spite of previous beliefs, discogenic etiologies are not common causes of LBP. Thus, even in patients with proven lumbar disc herniation by imaging, the physician should perform a thorough evaluation of the patient for other causes of LBP rather than lumbar disc herniation for avoiding unnecessary lumbar surgery

LBP/INJECTIONS

Plasma rich injection promote disc growth factors

European Spine Journal January 2014

Platelet-rich plasma induces annulus fibrosus cell proliferation and matrix production

T. N. Pirvu, J. E. Schroeder, M. Peroglio, S. Verrier, L. Kaplan, R. G. Richards, M. Alini, S. Grad

Abstract

Purpose

Platelet-rich plasma (PRP) contains growth factors and creates a 3D structure upon clotting; PRP or platelet lysate (PL) might be considered for annulus fibrosus (AF) repair.
Methods

Bovine AF cells were cultured with 25 % PRP, 50 % PRP, 25 % PL, 50 % PL, or 10 % FBS. After 2 and 4 days, DNA, glycosaminoglycan (GAG), and mRNA levels were analyzed. Histology was performed after injection of PRP into an AF defect in a whole disc ex vivo.
Results

By day 4, significant increases in DNA content were observed in all treatment groups. All groups also showed elevated GAG synthesis, with highest amounts at 50 % PL. Collagen I and II expression was similar between groups; aggrecan, decorin, and versican expression was highest at 25 % PL. Injection of PRP into the AF defect resulted in an increased matrix synthesis.

Conclusions

Platelet-rich preparations increased the matrix production and cell number and may therefore be considered to promote AF repair.

Surgery/LBP

WC surgeries

Spine J. 2014 Feb 1;14(2):263-73. doi: 10.1016/j.spinee.2013.10.041. Epub 2013 Nov 12.

Lumbar surgery in work-related chronic low back pain: can a continuum of care enhance outcomes? Mayer TG1, Gatchel RJ2, Brede E3, Theodore BR4.

BACKGROUND CONTEXT: Systematic reviews of lumbar fusion outcomes in purely workers' compensation (WC) patient populations have indicated mixed results for efficacy. Recent studies on lumbar fusions in the WC setting have reported return-to-work rates of 26% to 36%, reoperation rates of 22% to 27%, and high rates of persistent opioid use 2 years after surgery. Other types of lumbar surgery in WC populations are also acknowledged to have poorer outcomes than in non-WC. The possibility of improving outcomes by employing a biopsychosocial model with a continuum of care, including postoperative functional restoration in this "at risk" population, has been suggested as a possible solution.
PURPOSE: To compare objective socioeconomic and patient-reported outcomes for WC patients with different lumbar surgeries followed by functional restoration, relative to matched comparison patients without surgery. **STUDY DESIGN/SETTING:** A prospective cohort study of chronic disabling occupational lumbar disorder (CDOLD) patients with WC claims treated in an interdisciplinary functional restoration program. **PATIENT SAMPLE:** A consecutive cohort of 564 patients with prerehabilitation surgery completed a functional restoration and was divided into groups based on surgery type: lumbar fusion (F group, N=331) and nonfusion lumbar spine surgery (NF group, N=233). An unoperated comparison group was matched for length of disability (U group, N=349)..
METHODS: All patients completed an intensive, medically supervised functional restoration program combining quantitatively directed exercise progression with a multimodal disability management approach. The writing of this article was supported in part by National Institutes of Health Grant 1K05-MH-71892; no conflicts of interest are noted among the authors.
RESULTS: The F group had a longer length of disability compared with the NF and U groups (M=31.6, 21.7, and 25.9 months, respectively, p<.001). There were relatively few statistically significant differences for any socioeconomically relevant outcome among groups, with virtually identical postrehabilitation return-to-work (F=81%, NF=84%, U=85%, p=.409). The groups differed significantly after surgery on diagnosis of major depressive disorder and opioid dependence disorder as well as patient-reported depressive symptoms and pain intensity prerehabilitation. However, no significant differences in patient-reported outcomes were found postrehabilitation. Prerehabilitation opioid dependence disorder significantly predicted lower rates of work return and work retention as well as higher rates of treatment-seeking behavior. Higher levels of prerehabilitation perceived disability and depressive symptoms were significant risk factors for poorer work return and retention outcomes.
CONCLUSIONS: Lumbar surgery in the WC system (particularly lumbar fusion) have the potential achieve positive outcomes that are comparable to CDOLD patients treated nonoperatively. This study suggests that surgeons have the opportunity to improve lumbar surgery outcomes in the WC system, even for complex fusion CDOLD patients with multiple prior operations, if they control postoperative opioid dependence and prevent an excessive length of disability. Through early referral of patients (who fail to respond to usual postoperative care) to interdisciplinary rehabilitation, the surgeon determining this continuum of care may accelerate recovery and achieve socioeconomic outcomes of relevance to the patient and WC jurisdiction through the combination of surgery and postoperative rehabilitation.
 PMID: 24231782

Fusion in the elderly

Should age be a contraindication for degenerative lumbar surgery?

European Spine Journal, 01/24/2014 **Evidence Based Medicine**

Perez–Prieto D, et al.

Abstract

Introduction and purpose

The purpose of this study was to evaluate and compare disability, quality of life and satisfaction outcomes between young people and elderly who were operated on for degenerative lumbar disease.

Material and methods

A database of 263 patients undergoing lumbar surgery for degenerative conditions was collected. There were 74 patients who were 65 years old or above and 189 who were below 65 who had complete preoperative and 2-year postoperative HRQOL data measures: ODI, SF-36 and COMI.

Results

There were no significant differences in the outcomes between the two age groups ($p > 0.05$). An improvement from baseline in all quality of life measures in the two age groups was observed. A median improvement of 6.0 points was found in the ODI in the younger patients versus 12.0 in older ones. A median improvement in the SF36 physical component score of 6.95 was seen in the younger group while improvement was reported at 6.36 points in patients over 65. The SF36 mental component score improved by 4.48 points and 4.96 points, respectively. COMI improved a median of 1.2 points in both groups. In terms of satisfaction, 66.9 % of the younger patients were pleased or very pleased whereas this was found to be 59.7 % for the older group.

Conclusion

Older patients can see substantial clinical improvement after degenerative lumbar disease surgery similar to that obtained in younger patients in terms of quality of life and satisfaction. The improvement in terms of the disability is greater for older patients. Thus, age should not be a contraindication for this procedure

PELVIC GIRDLE

Abuse and pelvic pain

History of abuse and its relationship to pain experience and depression in women with chronic pelvic pain

American Journal of Obstetrics and Gynecology, 01/10/2014 **Clinical Article**
s–Sanie S, et al
Abstract

Objective

To determine the relationship between a history of physical or sexual abuse, pain experience and depressive symptoms among women with chronic pelvic pain (CPP).

Study Design

Cross-sectional study of women who presented to tertiary referral center for evaluation of CPP (N=273). All participants completed standardized questionnaires to assess a history of physical or sexual abuse, pain severity, pain disability, and depressive symptoms. Subjects were grouped by abuse category and compared to CPP participants without history of abuse. Multinomial logistic regression models were used to determine the association between adult and childhood physical or sexual abuse with pain intensity, pain-related disability, and depressive symptoms.

Results

Logistic regression analyses indicated that, after controlling for age and education, none of the abuse categories was associated with pain severity. However, adult sexual abuse predicted greater pain-related disability (odds ratio 2.39, 95% CI 1.05 – 5.40), while both adult physical and sexual abuse were associated with higher levels of depression (both $p < .05$). Level of education was significantly associated with pain intensity, pain disability, and depression.

Conclusion

For our sample of women with CPP, a history of abuse during childhood or adulthood was not associated with differences in pain intensity, but adult sexual abuse was associated with greater pain-related disability. A history of physical abuse or sexual abuse appears to hold a stronger relationship with current depressive symptoms than pain experience for women with CPP. Educational achievement holds a robust relationship with pain morbidity and depression for this population.

SI Joint assessment for spinal spondyloarthritis

Skeletal Radiol. 2014 Mar;43(3):351-8. doi: 10.1007/s00256-013-1789-y. Epub 2014 Jan 3.

Assessment of MRI abnormalities of the sacroiliac joints and their ability to predict axial spondyloarthritis: a retrospective pilot study on 110 patients.

Larbi A, Viala P, Molinari N, Lukas C, Baron MP, Taourel P, Cyteval C.

OBJECTIVE:
To assess sacroiliac joint (SIJ) modifications on MRI and their ability to predict axial spondyloarthritis (SpA) with the purpose of identifying parameters for future prospective studies.

METHODS:
Retrospective study was carried out of 110 consecutive patients referred for SIJ MRI with coronal, axial short TI inversion recovery (STIR), and axial T1 sequences over 6 months. Factors associated with SpA, including MRI SIJ modifications (fat deposition, structural abnormalities on T1-weighted images, and bone marrow edema [BME] on STIR sequences) and age were explored using multivariate logistic regression. The reference diagnosis was made 1-1.5 years later based on clinical, radiological, and biological findings, according to Assessment of SpondyloArthritis International Society (ASAS) criteria.

RESULTS:
Twenty-eight patients were diagnosed with SpA (female/male: 19/9, age 41 ± 13 years). Abnormal findings were found in up to 21 % of patients without SpA (including 11 % with BME), versus 64 % of SpA patients (50 % with BME). A threshold age of 42.6 years was found to discriminate SpA patients (ROC AUC: 0.71, 95 % CI: 0.59-0.81). BME location in the sacral (OR: 7.07 [1.05, 47.6], p = 0.044) and both sacral and iliac areas (OR: 36.0 [5.61, 231], p = 0.0002), as well as age (OR: 0.95 [0.92, 0.98], p = 0.0019) were found to be independent predictors of SpA. 83.6 % of patients were effectively diagnosed using BME location and patient age in a classification and regression tree (CART) algorithm (sensitivity: 61 %, specificity: 91 %, PPV: 71 %, NPV: 87 %).

CONCLUSION:
The BME location combined with the patient's age (threshold 42.6 years) could help predict SpA. Further studies are required before these features can be used by radiologists to boost their confidence in reporting SIJ MRI.

PMID: 24382631

Pelvic pain post partum

BMC Pregnancy Childbirth. 2014 Jan 25;14(1):48.

Pregnancy-related low back pain and pelvic girdle pain approximately 14 months after pregnancy - pain status, self-rated health and family situation.

Bergström C, Persson M, Mogren I.

Abstract

BACKGROUND:

Pelvic girdle pain (PGP) in pregnancy is distinct from pregnancy-related low back pain (PLBP). However, women with combined PLBP and PGP report more serious consequences in terms of health and function. PGP has been estimated to affect about half of pregnant women, where 25% experience serious pain and 8% experience severe disability. To date there are relatively few studies regarding persistent PLBP/PGP postpartum of more than 3 months, thus the main objective was to identify the prevalence of persistent PLBP and PGP as well as the differences over time in regard to pain status, self-rated health (SRH) and family situation at 12 months postpartum.

METHODS:

The study is a 12 month follow-up of a cohort of pregnant women developing PLBP and PGP during pregnancy, and who experienced persistent pain at 6 month follow-up after pregnancy. Women reporting PLBP/PGP (n = 639) during pregnancy were followed up with a second questionnaire at approximately six month after delivery. Women reporting recurrent or persistent LBP/PGP at the second questionnaire (n = 200) were sent a third questionnaire at 12 month postpartum.

RESULTS:

A total of 176 women responded to the questionnaire. Thirty-four women (19.3%) reported remission of LBP/PGP, whereas 65.3% (n = 115) and 15.3% (n = 27), reported recurrent LBP/PGP or continuous LBP/PGP, respectively. The time between base line and the 12 months follow-up was in actuality 14 months. Women with previous LBP before pregnancy had an increased odds ratio (OR) of reporting 'recurrent pain' (OR = 2.47) or 'continuous pain' (OR = 3.35) postpartum compared to women who reported 'no pain' at the follow-up. Women with 'continuous pain' reported statistically significant higher level of pain at all measure points (0, 6 and 12 months postpartum). Non-responders were found to report a statistically significant less positive scoring regarding relationship satisfaction compared to responders.

CONCLUSIONS:

The results from this study demonstrate that persistent PLBP/PGP is a major individual and public health issue among women 14 months postpartum, negatively affecting their self-reported health. However, the perceived relationship satisfaction seems to be stable between the groups.

PMID: 24460727

Impact of leg length discrepancy

European Spine Journal
January 2014

Does age affect the response of pelvis and spine to simulated leg length discrepancies? A rasterstereographic pilot study

Michael Wild, Britta Kühlmann, Anna Stauffenberg, Pascal Jungbluth, Mohssen Hakimi, Walter Rapp, Marcel Betsch

Abstract

Purpose

The purpose of this study was to investigate age differences in the response of the spine and pelvis to simulated leg length inequalities (LLIs).

Methods

A total of 107 subjects, separated into three age groups (group 1: 20–39 years, group 2: 40–59 years, group 3: >60 years), were used to evaluate for any age effects in the response to LLIs. LLIs of +10, +20, and +30 mm were simulated with a simulation platform on both sides, and the respective changes of pelvic position (pelvic obliquity, pelvic torsion) and spinal posture (lateral deviation, surface rotation, kyphotic, and lordotic angles) were measured with a rasterstereographic system.

Results

In all three age groups an increase in LLI led to significant changes in the pelvic position as measured by the parameters of pelvic obliquity and torsion. No significant differences in the response of the pelvis to the LLIs were found between the age groups. In all age groups an increase in surface rotation and lateral deviation of the spine with increasing LLIs was found. However, none of these parameters responded significantly different between the three age groups.

Conclusions

Under static conditions, LLIs lead to significant changes of the pelvic position and spinal posture. Despite all known age-related changes, no significant differences of the measured pelvic and spinal parameters in elderly patients as a response to the simulated LLIs occurred.

Sciatic nerve mobility

Manual Therapy
Volume 19, Issue 1 , Pages 59-64, February 2014

Normative sciatic nerve excursion during a modified straight leg raise test⋆

Colette Ridehalgh, Ann Moore, Alan Hough

Abstract

Minimal data exists on how much sciatic nerve motion occurs during straight leg raise (SLR). The purpose of this study was to report preliminary normative ranges of sciatic nerve excursion using real time ultrasound during a modified SLR.

The sciatic nerve was scanned in the posterior thigh in sixteen asymptomatic participants (age range 19–68 years). Nerve excursion was measured in transverse and longitudinal planes during knee extension from 90° to 0°, with the hip flexed to 30° and 60°. The ultrasound data was analysed off-line using cross correlation software. Results demonstrated that most nerves moved superficially during knee extension, a large proportion (10/16) moved laterally. Longitudinal excursion ranged from 6.4 to 14.7 mm (mean (SD) 9.92 mm (2.2)) in 30° hip flexion, and 5.1–20.2 mm (mean (SD) 12.4 mm (4.4)) in 60° hip flexion. Mean nerve excursion was significantly greater in 60° hip flexion ($p = 0.02$).

There is a large between-subject variation in sciatic nerve excursion during this modified SLR in asymptomatic subjects. Mean nerve excursion was found to be higher with the hip pre-positioned in greater flexion, suggesting that pre-loading may not consistently reduce excursion.

Keywords: Nerve excursion, Neurodynamics, B mode ultrasound, Straight leg raise

SI inflammation

Eur J Radiol. 2014 Jan;83(1):179-84. doi: 10.1016/j.ejrad.2013.10.001. Epub 2013 Oct 16.

MRI of the SI joints commonly shows non-inflammatory disease in patients clinically suspected of sacroiliitis.

Jans L1, Van Praet L2, Elewaut D2, Van den Bosch F2, Carron P2, Jaremko JL3, Behaeghe M4, Denis A4, Huysse W4, Lambrecht V4, Verstraete K4.
Author information

Abstract

PURPOSE:
To determine the prevalence of clinically relevant non-inflammatory disease on MRI of the sacroiliac (SI) joints in patients suspected of sacroiliitis. To assess the added value of axial imaging of the pelvis in these patients.

METHODS:
In a retrospective study of 691 patients undergoing MRI of the SI joints from January 2006 to December 2012 for inflammatory back pain the prevalence of sacroiliitis and non-inflammatory disease was recorded.

RESULTS:
In 285 (41%) patients MRI did not show any abnormal findings. In 36% of patients MRI features of sacroiliitis were present. Spinal degenerative changes were the most common non-inflammatory finding in 305 patients (44.1%) and consisted of disc degeneration in 222 (32%) patients, facet joint arthrosis in 58 (8.4%) patients and disc herniation in 25 (3.6%) patients. Hip joint disease in 44 (6.4%) patients, lumbosacral transitional anomaly in 41 (5.9%) patients, SI joint degenerative changes in 25 (3.6%) patients and diffuse idiopathic skeletal hyperostosis in 24 (3.5%) patients were also common. Osteitis condensans ilii in 17 (2.5%) patients, tumour in 11 (1.6%) patients, fracture in 8 (1.2%) patients, infection in 4 (0.6%) patients and acute spondylolysis in 2 patients (0.3%) were less frequently seen.

CONCLUSION:
Our study shows that non-inflammatory disease is more common than true sacroiliitis on MRI of the SI joints in patients with inflammatory type back pain. Axial pulse sequences may demonstrate unexpected findings that remain undetected if only coronal images are obtained. Clinical relevance statement:, MRI of the SI joints may demonstrate conditions that clinically mimic sacroiliitis. Axial imaging of the pelvis may help detect these unexpected findings.

KEYWORDS: Back pain, Inflammation, Magnetic resonance imaging, Sacroiliac joint, Sacroiliitis PMID: 24168927 [PubMed - in process]

Test for hypermobility

Man Ther. 2013 Nov 20. pii: S1356-689X(13)00190-2. doi: 10.1016/j.math.2013.11.003

Quantitative investigation of ligament strains during physical tests for sacroiliac joint pain using finite element analysis.

Kim YH1, Yao Z2, Kim K3, Park WM2.
Author information

Abstract

It may be assumed that the stability is affected when some ligaments are injured or loosened, and this joint instability causes sacroiliac joint pain.

Several physical examinations have been used to diagnose sacroiliac pain and to isolate the source of the pain. However, more quantitative and objective information may be necessary to identify unstable or injured ligaments during these tests due to the lack of understanding of the quantitative relationship between the physical tests and the biomechanical parameters that may be related to pains in the sacroiliac joint and the surrounding ligaments.

In this study, a three-dimensional finite element model of the sacroiliac joint was developed and the biomechanical conditions for six typical physical tests such as the compression test, distraction test, sacral apex pressure test, thigh thrust test, Patrick's test, and Gaenslen's test were modelled. The sacroiliac joint contact pressure and ligament strain were investigated for each test. The values of contact pressure and the combination of most highly strained ligaments differed markedly among the tests.

Therefore, these findings in combination with the physical tests would be helpful to identify the pain source and to understand the pain mechanism. Moreover, the technology provided in this study might be a useful tool to evaluate the physical tests, to improve the present test protocols, or to develop a new physical test protocol.

KEYWORDS: Biomechanics, Finite element analysis, Physical test, Sacroiliac joint pain
PMID: 24378472

VISCERA

Sphincter of Oddi dysfunction

Am J Gastroenterol. 2014 Jan 21. doi: 10.1038/ajg.2013.467.

Psychosocial Characteristics and Pain Burden of Patients With Suspected Sphincter of Oddi Dysfunction in the EPISOD Multicenter Trial.

Brawman-Mintzer O1, Durkalski V2, Wu Q2, Romagnuolo J2, Fogel E3, Tarnasky P4, Aliperti G5, Freeman M6, Kozarek R7, Jamidar P8, Wilcox M9, Elta G10, Orrell K11, Wood A2, Mauldin P2, Serrano J12, Drossman D13, Robuck P12, Cotton P2.

Abstract

OBJECTIVES: Patients with several painful functional gastrointestinal disorders (FGIDs) are reported to have a high prevalence of psychosocial disturbance. These aspects have not been studied extensively in patients with suspected Sphincter of Oddi dysfunction (SOD).

METHODS:A total of 214 patients with post-cholecystectomy pain and suspected SOD were enrolled in seven US centers in a multicenter-randomized trial (Evaluating Predictors and Interventions in Sphincter of Oddi Dysfunction). Baseline assessments included pain descriptors and burden, structured psychosocial assessments of anxiety/depression, coping, trauma, and health-related quality of life. Patients with high levels of depression, suicidal ideation, or psychosis were excluded.

RESULTS:

The study population (92% female, mean age 38) reported anxiety (9%), depression (8%), past sexual trauma (18%), and physical abuse (10%). Of the total screened population (n=1460), 3.9% of the patients were excluded because of the presence of defined severe psychological problems. The mean medical outcomes study short-form-36 (SF-36) physical and mental composite scores were 38.70 (s.d.=7.89) and 48.74 (s.d.=9.60), respectively. Most subjects reported symptoms of other FGIDs. There were no correlations between the extent of the pain burden in the 3 months before enrollment and the baseline anxiety scores or victimization history. However, those with greater pain burden were significantly more depressed. There were no meaningful differences in the psychosocial parameters in subjects with or without irritable bowel, and those who had cholecystectomy for stones or functional gallbladder disease. Those declining randomization were comparable to those randomized.

CONCLUSIONS:

Psychosocial comorbidity in SOD is high. However, it does not appear to differ significantly from that reported in surveys of age- and gender-matched general populations, and may be lower than reported with other FGIDs.

Am J Gastroenterol advance online publication, 21 January 2014; doi:10.1038/ajg.2013.467.

PMID: 24445573

Genital pain

Scandinavian Journal of Pain
Volume 5, Issue 1 , Pages 19-25, January 2014

Living with genital pain: Sexual function, satisfaction, and help-seeking among women living in Sweden

Johanna Thomtén

Abstract

Background and aims Female genital pain is a debilitating problem that negatively affects several aspects of the life of women. Several studies present figures of prevalence indicating that the problem affects nearly 20% of young women. However, many women fail to consult health care and the estimated prevalence therefore remains insecure. Historically, genital pain was commonly viewed as either physiological or psychosexual. Although the current field of research and clinical expertise in general agree upon a biopsychosocial conceptualization, less is known about the manifestation of the problem in everyday life and the experience of seeking health care among afflicted women. The objectives of the present study was to examine genital pain in a general female population living in Sweden cross-sectionally in terms of prevalence, sexual function, sexual satisfaction and help seeking, and to identify possible predictors of genital pain among women.

Methods The study was a population-based study using a postal questionnaire administered to 4052 women (age 18–-35). Of these 944 (response rate: 23%) took part in the study.

Results Genital pain of six months duration was reported by 16.1% of the women. Women with pain more commonly reported fungal infections, other pain problems, sexual dysfunctions and symptoms of anxiety than pain-free women and in addition lower sexual satisfaction. There were no differences in sexual frequency. Pain was most commonly reported during sexual intercourse, but many women also experienced pain during non-sexual activities, with pain durations of several hours after the pain eliciting activity was interrupted. Of those reporting pain, 50% had sought care for their pain. The most common was to counsel a doctor and to receive topical treatment. However, the experienced effects of the treatments were on average low. In the explanatory model, fungal infections, and sexual dysfunctions were associated with genital pain.

Conclusions

The study had a low response rate, but still indicates that genital pain is common and negatively affects several aspects of women' life, not just sexual activities. Although many women report pro-longed pain experiences, many fail to consult health care and among those who seek care the effects of treatment are on average poor. There are strong associations between sexual dysfunctions (lack of sexual arousal, vaginal muscle tension hindering intercourse) and genital pain that, based on previous findings in this field of research, might be viewed in terms of circular maintaining processes.

Implications

Female genital pain is not just limited to the sexual context, but often negatively affects several situations in women' life. The size of the problem calls for immediate development of preventive interventions and treatment programs that focus on sexual education and to encourage a healthy sexuality among women and their partners. There is a need to identify methods in order to assemble evidence based interventions of female genital pain. Such methods are currently lacking, resulting in poor treatment options for women with pain.

Keywords: Genital pain, Sexual pain, Women, Dyspareunia, Sexual function, Sexual satisfaction

THORACIC SPINE

Kyphosis

BMC Musculoskelet Disord. 2014 Jan 16;15(1):19.

Kyphosis and paraspinal muscle composition in older men: a cross-sectional study for the osteoporotic fractures in men (MrOS) research group.

Katzman WB, Miller-Martinez D, Marshall LM, Lane NE, Kado DM.

Abstract

BACKGROUND:
The prevalence of hyperkyphosis is increased in older men; however, risk factors other than age and vertebral fractures are not well established. We previously reported that poor paraspinal muscle composition contributes to more severe kyphosis in a cohort of both older men and women.

METHODS:
To specifically evaluate this association in older men, we conducted a cross-sectional study to evaluate the association of paraspinal muscle composition and degree of thoracic kyphosis in an analytic cohort of 475 randomly selected participants from the Osteoporotic Fractures in Men (MrOS) study with baseline abdominal quantitative computed tomography (QCT) scans and plain thoracic radiographs. Baseline abdominal QCT scans were used to obtain abdominal body composition measurements of paraspinal muscle and adipose tissue distribution. Supine lateral spine radiographs were used to measure Cobb angle of kyphosis. We examined the linear association of muscle volume, fat volume and kyphosis using loess plots. Multivariate linear models were used to investigate the association between muscle and kyphosis using total muscle volume, as well as individual components of the total muscle volume, including adipose and muscle compartments alone, controlling for age, height, vertebral fractures, and total hip bone mineral density (BMD). We examined these associations among those with no prevalent vertebral fracture and those with BMI < 30 kg/m2.

RESULTS:
Among men in the analytic cohort, means (SD) were 74 (SD = 5.9) years for age, and 37.5 (SD = 11.9) degrees for Cobb angle of kyphosis. Men in the lowest tertile of total paraspinal muscle volume had greater mean Cobb angle than men in the highest tertile, although test of linear trend across tertiles did not reach statistical significance. Neither lower paraspinal skeletal muscle volume (p-trend = 0.08), or IMAT (p-trend = 0.96) was associated with greater kyphosis. Results were similar among those with no prevalent vertebral fractures. However, among men with BMI < 30 kg/m2, total paraspinal muscle volume in the lowest tertile of paraspinal muscle volume, there was greater adjusted mean kyphosis (40.0, 95% CI: 37.8 - 42.1) compared to the highest tertile (36.3, 95% CI: 34.2 - 38.4).

CONCLUSIONS:
These results suggest that differences in body composition may potentially influence kyphosis.
PMID: 24428860

Measuring thoracic kyphosis

Manual Therapy

Volume 19, Issue 1 , Pages 10-17, February 2014

Reliability and validity of non-radiographic methods of thoracic kyphosis measurement: A systematic review

Eva Barrett, Karen McCreesh, Jeremy Lewis

Abstract

Background

A wide array of instruments are available for non-invasive thoracic kyphosis measurement. Guidelines for selecting outcome measures for use in clinical and research practice recommend that properties such as validity and reliability are considered. This systematic review reports on the reliability and validity of non-invasive methods for measuring thoracic kyphosis.

Methods

A systematic search of 11 electronic databases located studies assessing reliability and/or validity of non-invasive thoracic kyphosis measurement techniques. Two independent reviewers used a critical appraisal tool to assess the quality of retrieved studies. Data was extracted by the primary reviewer. The results were synthesized qualitatively using a level of evidence approach.

Results

27 studies satisfied the eligibility criteria and were included in the review. The reliability, validity and both reliability and validity were investigated by sixteen, two and nine studies respectively. 17/27 studies were deemed to be of high quality. In total, 15 methods of thoracic kyphosis were evaluated in retrieved studies. All investigated methods showed high (ICC $\geq$ .7) to very high (ICC $\geq$ .9) levels of reliability. The validity of the methods ranged from low to very high.

Conclusion

The strongest levels of evidence for reliability exists in support of the Debrunner kyphometer, Spinal Mouse and Flexicurve index, and for validity supports the arcometer and Flexicurve index. Further reliability and validity studies are required to strengthen the level of evidence for the remaining methods of measurement. This should be addressed by future research.

Keywords: Reliability, Validity, Thoracic kyphosis, Measurement

CERVICAL SPINE

Motor function in CNP

Modulation of intracortical inhibition in response to acute psychosocial stress is impaired among individuals with chronic neck pain □

Journal of Psychosomatic Research, 01/06/2014 Clinical Article
Marker RJ, et al.
Abstract

Objective

Psychosocial stress has been associated with a variety of chronic pain disorders although the mechanisms responsible for this relationship are unknown. The purpose of this study was to compare the excitability of intracortical and corticospinal pathways to the trapezius muscle in individuals with and without chronic neck pain during exposure to low and high levels of psychosocial stress.

Methods

Single and paired-pulse transcranial magnetic stimulation was used to assess motor evoked potentials (MEPs) and short-interval intracortical inhibition (SICI) during mental math performed in the presence and absence of social evaluative threat.

Results

All participants demonstrated higher amplitude MEPs in the high stress compared to the low stress condition ($p<0.01$). Participants with chronic neck pain had significantly greater SICI than healthy participants in the low stress condition ($p=0.03$). During exposure to the stressor, healthy participants showed an increase in SICI, whereas participants with neck pain showed no change (group difference for change in SICI, $p<0.01$).

Conclusions

These findings suggest that individuals with chronic neck pain inhibit motor output to the trapezius in the presence of minor stressors, and are unable to compensate for additional stress-evoked increases in corticospinal excitability through further modulation of SICI. This observation has potential implications for the management of patients who have difficulty relaxing painful muscles during times of stress.

Keywords: Transcranial magnetic stimulation, Motor evoked potential, Trapezius muscle, Anxiety, Electromyography, Motor cortex

Pain measurments

Pain Pract. 2014 Jan 17. doi: 10.1111/papr.12169.

Measuring Pain Intensity in Patients with Neck Pain: Does It Matter How You Do It?

Kamper SJ, Grootjans SJ, Michaleff ZA, Maher CG, McAuley JH, Sterling M.
Author information

Abstract

The aim of this study was to investigate whether variations in the way that pain intensity is measured in patients with neck pain influences the magnitude of pain ratings. The study uses data from 3 longitudinal studies (n = 361 at baseline) on people with neck pain due to whiplash injuries. Pain measures included verbal rating scales, numerical rating scales and a visual analog scale. Different measures asked patient to rate current pain, average pain over 24 hours, over 1 week, or over 4 weeks. Scores were converted to a 0-100 scale and tracked over time, correlations between measures were calculated. Mixed models regression was used to explore the factors which influenced the differences between scores on the measures. Scores on the different measures were significantly different from each other in each dataset ($P < 0.02$). The effect of recall period was significant in all datasets and the effect of number of response options was significant in 2 of 3 datasets. Pain intensity ratings appear to be sensitive to method of measurement. It is likely the length of recall time (eg, pain today vs. average pain over 4 weeks) has a significant influence on pain ratings. The influence of number of response options is less certain. Systematic reviewers should not uncritically rescale and pool absolute pain scores from instruments with varying scale descriptors or recall periods.

KEYWORDS: measurement, neck pain, pain score, whiplash PMID: 24433369

Exercise

Manual Therapy
Volume 19, Issue 1 , Pages 25-31, February 2014

Immediate effects of active cranio-cervical flexion exercise versus passive mobilisation of the upper cervical spine on pain and performance on the cranio-cervical flexion test

Enrique Lluch, Jochen Schomacher, Leonardo Gizzi, Frank Petzke, Dagmar Seegar, Deborah Falla

Abstract

This study compared the immediate effects of an assisted plus active cranio-cervical flexion exercise (exercise group) versus a passive mobilisation plus assisted cranio-cervical flexion (mobilisation group) on performance of the cranio-cervical flexion test (CCFT), cervical range of motion (ROM) and pain in patients with chronic neck pain. Eighteen volunteers with chronic idiopathic neck pain participated in the study and were randomised to one of the two intervention groups. Current level of pain, cervical ROM and pain perceived during movement, pressure pain threshold (PPT) and surface electromyography (EMG) during performance of the CCFT were measured before and immediately after the intervention. A significant reduction in resting pain and PPT measured over cervical sites was observed immediately following both interventions, although a greater change was observed for the exercise group. No change in cervical ROM was observed after either intervention. Reduced sternocleidomastoid and anterior scalene EMG amplitude were observed during stages of the CCFT but only for the participants in the active exercise group.

Although both active and passive interventions offered pain relief, only the exercise group improved on a task of motor function highlighting the importance of specific active treatment for improved motor control of the cervical spine.

Keywords: Neck pain, Mobilization, Exercise, Intervention, EMG

C spine posture on lifting

Manual Therapy
Volume 19, Issue 1 , Pages 32-36, February 2014

Does posture of the cervical spine influence dorsal neck muscle activity when lifting?

Anneli Peolsson, Eivind Marstein, Timothy McNamara, Damien Nolan, Espen Sjaaberg, Michael Peolsson, Gwendolen Jull, Shaun O'Leary

Abstract

Previous studies have shown that postural orientations of the neck, such as flexed or forward head postures, are associated with heightened activity of the dorsal neck muscles. While these studies describe the impact of variations in neck posture alone, there is scant literature regarding the effect of neck posture on muscle activity when combined with upper limb activities such as lifting. The purpose of this study was to evaluate the effect of three different neck postures on the activity of the different layers of the dorsal neck muscles during a lifting task. Ultrasound measurements of dorsal neck muscle deformation were compared over two time points (rest, during lift) during a lifting task performed in three different neck postural conditions (neutral, flexed and forward head posture) in 21 healthy subjects. Data were analysed by post-process speckle tracking analysis. Results demonstrated significantly greater muscle deformation induced by flexed and forward head postures, compared to the neutral posture, for all dorsal neck muscles at rest ($p<0.05$). Significant condition by time interactions associated with the lift was observed for four out of the five dorsal muscles ($p<0.02$). These findings demonstrate that posture of the cervical spine influenced the level of muscle deformation not only at rest, but also when lifting.

The findings of the study suggest that neck posture should be considered during the evaluation or design of lifting activities as it may contribute to excessive demands on dorsal neck muscles with potential detrimental consequences.

Keywords: Cervical posture, Ultrasound, Lifting, Neck muscle

Eye motion assessment in chronic neck pain

Head-Eye movement control tests in patients with chronic neck pain; Inter-observer reliability and discriminative validity

Eveline Della Casa, **Jutta Affolter Helbling**, **André Meichtry**, **Hannu Luomajoki** and **Jan Kool**

BMC Musculoskeletal Disorders 2014, **15**:16 doi:10.1186/1471-2474-15-16

Background
Head-eye movement control deficit is an identified problem in patients with chronic neck pain, particularly in cases of whiplash associated disorders (WAD). To date, there is no evidence concerning the reliability and validity of visually assessed active head-eye movement control tests. Therefore, the objectives of the present cross-sectional study were, a) to develop a test battery; and b) to investigate inter-observer reliability and discriminative validity in patients with chronic neck pain compared to healthy controls.

Methods
The study was conducted at two physiotherapy clinics in Switzerland. Ethics Committee approval was obtained. Ten active head-eye coordination tests, on 23 patients with chronic neck pain and associated symptoms and 19 healthy controls, were videotaped. The tests included eye movements in the neutral head position and 45[degree sign] relative neck rotation, gaze stability and sequential head-eye movements. All tests were performed in the sitting and standing positions. Two blinded physiotherapists independently rated the randomized videos. Performance was rated as "negative", "moderately positive" or "clearly positive". Weighted kappa (wK) and 95% confidence intervals (CI) were calculated to investigate inter-observer reliability. Good reliability was defined as wK >0.5 with a lower boundary of 95% CI >0.2. Odds ratios (to define cut-off points) and the distribution of the classificator, numbers of positive tests, were calculated.

Results
Three out of ten tests showed "excellent" (wK 0.82 to 0.86), five out of ten tests showed "substantial" (wK 0.69 to 0.79) and two out of ten tests showed "moderate" (wK 0.54 to 0.59) reliability. Results were comparable in the sitting and standing positions. On average, three out of five tests were rated positive in patients and one out of five tests was rated positive in healthy controls. An odds ratio of 13.3 to 18.6 was obtained using >=2/5 tests as a cut-off point.

Conclusion
Visual assessment by physiotherapists of head-eye movement control tests is reliable. The test battery is able to discriminate between patients with chronic neck pain and healthy controls. There were no differences in performance between the sitting and standing positions. The test battery can therefore be reduced to five tests. Further research is needed to identify the test-retest stability and responsiveness

Muscle changes with whiplash

Spine (Phila Pa 1976). 2014 Jan 1;39(1):39-47. doi: 10.1097/BRS.0000000000000033.

Differential changes in muscle composition exist in traumatic and nontraumatic neck pain.

Elliott JM, Pedler AR, Jull GA, Van Wyk L, Galloway GG, O'leary SP.
Author information

Abstract

STUDY DESIGN:
A population based cross-sectional study.

OBJECTIVE:
To clarify relative constituents of viable muscle in 2-dimensional cross-sectional area (CSA) measures of ventral and dorsal cervical muscles in patients with chronic whiplash-associated disorders (WAD), idiopathic neck pain, and healthy controls.

SUMMARY OF BACKGROUND DATA:
Previous data using T1-weighted magnetic resonance image demonstrated large amounts of neck muscle fat infiltration and increased neck muscle CSA in patients with chronic WAD but not in idiopathic neck pain or healthy controls.

METHODS:
Magnetic resonance images were obtained for 14 cervical muscle regions in 136 females, including 79 with chronic whiplash, 23 with chronic idiopathic neck pain, and 34 healthy controls.

RESULTS:
Without fat removed, relative CSA of 7 of 14 muscle regions in the participants with chronic WAD was larger, 3 of 14 smaller and 4 of 14 similar to healthy individuals. When T1-weighted signal representing the lipid content of these muscles was removed, 8 of 14 relative muscle CSA in patients with whiplash were similar, 5 of 14 were smaller and only 1 of 14 was larger than those observed in healthy controls. Removal of fat from the relative CSA measurement did not alter findings between participants with idiopathic neck pain and healthy controls.

CONCLUSION:
These findings clarify that previous reports of increased relative CSA in patients with chronic whiplash represent cervical muscle pseudohypertrophy. Relative muscle CSA measures reveal atrophy in several muscles in both patients with WAD and idiopathic neck pain, which supports inclusion of muscle conditioning in the total management of these patients.Level of Evidence: 3.

PMID: 24270932

Articular changes

Manual Therapy
Volume 19, Issue 1 , Pages 2-9, February 2014

Articular dysfunction patterns in patients with mechanical neck pain: A clinical algorithm to guide specific mobilization and manipulation techniques

Vincent Dewitte, Axel Beernaert, Bart Vanthillo, Tom Barbe, Lieven Danneels, Barbara Cagnie

Abstract

In view of a didactical approach for teaching cervical mobilization and manipulation techniques to students as well as their use in daily practice, it is mandatory to acquire sound clinical reasoning to optimally apply advanced technical skills. The aim of this Masterclass is to present a clinical algorithm to guide (novice) therapists in their clinical reasoning to identify patients who are likely to respond to mobilization and/or manipulation. The presented clinical reasoning process is situated within the context of pain mechanisms and is narrowed to and applicable in patients with a dominant input pain mechanism. Based on key features in subjective and clinical examination, patients with mechanical nociceptive pain probably arising from articular structures can be categorized into specific articular dysfunction patterns. Pending on these patterns, specific mobilization and manipulation techniques are warranted. The proposed patterns are illustrated in 3 case studies. This clinical algorithm is the corollary of empirical expertise and is complemented by in-depth discussions and knowledge exchange with international colleagues.

Consequently, it is intended that a carefully targeted approach contributes to an increase in specificity and safety in the use of cervical mobilizations and manipulation techniques as valuable adjuncts to other manual therapy modalities.

Keywords: Articular dysfunction patterns, Clinical reasoning, Cervical spine, Spinal manipulation

Normal neck alignment in adolescents

Cervical spine alignment in the pediatric population: a radiographic normative study of 150 asymptomatic patients

European Spine Journal, 01/07/2014 **Evidence Based Medicine**
Abelin–Genevois K, et al
Abstract

Purpose

To describe the normal cervical sagittal alignment of the pediatric spine in a normal population and to identify the changes during growth period.

Methods

We randomly selected in PACS database 150 full-spine standing views. Exclusion criteria were: age >18 years, spinal deformity and any disease affecting the spine (medical charts reviewing). For cervical alignment we measured: OC-angle according to Mc Gregor, C1C7 angle, upper cervical angle, inferior cervical angle and C7 tilt. Spino pelvic parameters were analyzed: T1 tilt, thoracic kyphosis, lumbar lordosis, pelvic incidence, sacral slope and pelvic tilt. We compared two age subgroups (juvenile and adolescent). Differences between age groups and gender were tested using Student's *t* test. Correlations between sagittal spinal parameters were evaluated using Pearson's test.

Results

Cervical spine shape was correlated to cranio cervical orientation to maintain horizontal gaze ($r = 0.60$) and to thoracic kyphosis ($r = -0.46$). Cervical spine alignment was significantly different between the two age groups except for the global C1C7 cervical lordosis, which remained stable. A significant gender difference was found for all the cervical sagittal angles ($p < 0.01$) whereas no differences were demonstrated for the spino pelvic parameters, except the lumbar lordosis ($p = 0.047$).

Conclusions

This study is the first to report the cervical spinal alignment in a normal pediatric Caucasian population. Even though cervical lordosis is the common shape, our results showed variability in cervical sagittal alignment. Cervical spine is a junctional area that adjusts its alignment to the head position and to the underlying spinal alignment.

UPPER C SPINE

Arterial assessment

Man Ther. 2013 Nov 23. pii: S1356-689X(13)00192-6. doi: 10.1016/j.math.2013.11.005.

International framework for examination of the cervical region for potential of Cervical Arterial Dysfunction prior to Orthopaedic Manual Therapy intervention.

Rushton A1, Rivett D2, Carlesso L3, Flynn T4, Hing W5, Kerry R6.
Author information

Abstract

A consensus clinical reasoning framework for best practice for the examination of the cervical spine region has been developed through an iterative consultative process with experts and manual physical therapy organisations. The framework was approved by the 22 member countries of the International Federation of Orthopaedic Manipulative Physical Therapists (October 2012). The purpose of the framework is to provide guidance to clinicians for the assessment of the cervical region for potential of Cervical Arterial Dysfunction in advance of planned management (inclusive of manual therapy and exercise interventions). The best, most recent scientific evidence is combined with international expert opinion, and is presented with the intention to be informative, but not prescriptive; and therefore as an aid to the clinician's clinical reasoning. Important underlying principles of the framework are that 1] although presentations and adverse events of Cervical Arterial Dysfunction are rare, it is a potentially serious condition and needs to be considered in musculoskeletal assessment; 2] manual therapists cannot rely on the results of one clinical test to draw conclusions as to the presence or risk of Cervical Arterial Dysfunction; and 3] a clinically reasoned understanding of the patient's presentation, including a risk:benefit analysis, following an informed, planned and individualised assessment, is essential for recognition of this condition and for safe manual therapy practice in the cervical region.

Clinicians should also be cognisant of jurisdictionally specific requirements and obligations, particularly related to patient informed consent, when intending to use manual therapy in the cervical region.

KEYWORDS: Arterial, Cervical, Examination, Manual therapy PMID: 2437847

CRANIUM/TMJ

Lateral Pterygoid

J Contemp Dent Pract. 2005 Aug 15;6(3):22-9.

Pressure pain threshold of the lateral pterygoid muscles in TMD patients and controls.

Abou-Atme YS, Melis M, Zawawi KH.
Author information

Abstract

OBJECTIVES:
The aim of this experiment was to detect pressure pain threshold (PPT) differences on intra-oral palpation of the lateral pterygoid muscle (LPM) between subjects diagnosed with temporomandibular disorders (TMD) and controls.

METHODS:
Thirty-one consecutive female TMD patients and 31 age and gender matched controls underwent palpation of the LPM using an algometer made with a queue-tip connected to a digital scale, and PPT was measured.

RESULTS:
Mean PPTs of the right and left LPM of the controls were respectively 191g (49KPa) and 200g (51KPa), and mean PPTs of the right and left LPM of TMD patients were respectively 245g (62KPa) and 256g (63KPa). ANOVA between the four PPT measurements showed significant difference only between the PPT readings of the right LPM of the controls and the left LPM of the patients ($p<0.05$).

CONCLUSIONS:
The findings of this study suggest that PPT measured by means of the described algometer is not decreased in TMD patients as compared to control subjects.

PMID: 16127469

Lateral Pterygoid

J Dent. 2001 Sep;29(7):475-83.

Palpation of the lateral pterygoid region in TMD--where is the evidence?

Türp JC, Minagi S.
Author information

Abstract

OBJECTIVE:
Palpation of the lower head of the lateral pterygoid muscle is included in many study protocols and examination schemes of the masticatory system. The aim of this investigation was to search the medical/dental literature to find evidence for the validity and reliability of this diagnostic procedure.

METHODS:
A systematic search was carried out using different electronic databases (Medline Ovid, PubMed, Cochrane Library, Embase, Current Contents Connect, Science Citation Index, Web of Science, Japana Centra Revuo Medicina), supplemented by handsearch in selected journals and by examination of the bibliographies of the identified articles.

RESULTS:
Validity: As far as the palpability of the inferior head of the lateral pterygoid muscle is concerned, five publications representing four studies could be identified. According to these investigations, the lateral pterygoid muscle is practically inaccessible for intraoral palpation due to topographical and anatomical reasons. Other anatomical structures, such as the superficial head of the medial pterygoid muscle, may be palpated instead in this region. Reliability: Determination of the palpability of the lateral pterygoid muscle is characterized by poor interexaminer agreement. Studies investigating the presence of pain in response to palpation of the lateral pterygoid area revealed a moderate intra- and interindividual reliability. Because of the tenderness of the lateral pterygoid region even among healthy subjects, positive findings may lead to wrong conclusions with regard to the need of treatment.

CONCLUSIONS:
Considering the lack of validity and reliability associated with the palpation of the lateral pterygoid area, this diagnostic procedure should be discarded.

PMID: 11809325

HEADACHES

Gum chewing and HA

Pediatr Neurol. 2014 Jan;50(1):69-72. doi: 10.1016/j.pediatrneurol.2013.08.015. Epub 2013 Nov 1.

The influence of excessive chewing gum use on headache frequency and severity among adolescents.

Watemberg N1, Matar M2, Har-Gil M3, Mahajnah M4.
Author information

Abstract

BACKGROUND:
Excessive gum-chewing is underreported as a headache precipitant in children and adolescents. We evaluated the influence of daily excessive gum-chewing in older children and teenagers with chronic headache, emphasizing the impact of habit discontinuation and its reintroduction.

METHODS:
Patients with chronic headache and excessive gum-chewing were consecutively recruited and asked to fill questionnaire pertaining headache characteristics, potential triggers, family history of headaches, and gum-chewing habits. These individuals were classified into four groups depending on the number of daily hours of gum-chewing. All children discontinued chewing for 1 month, reintroduced the habit, and were reinterviewed after 2 to 4 weeks.

RESULTS:
Thirty patients (25 girls) were recruited. Median age was 16 years. Most had migraine-like headaches. Following gum-chewing discontinuation, 26 reported significant improvement, including headache resolution in 19. All 20 patients reinstituting the habit reported symptom relapse within days. Duration of headache before discontinuation and the number of daily hours of chewing had no influence on the response to habit discontinuation.

CONCLUSION:
Excessive daily gum-chewing may be associated with chronic headache and should get more attention in the medical literature. Physician and patient awareness of this association could have a meaningful impact on the quality of life of children and adolescents with chronic headache who chew gum excessively.

KEYWORDS:adolescents, chewing gum, children, headache, temporomandibular joint, trigger
PMID: 24188910

Cluster headaches onset

Cephalalgia. 2014 Jan 20.

Cluster headache: Is age of onset important for clinical presentation?

Zidverc-Trajkovic J, Markovic K, Radojicic A, Podgorac A, Sternic N.

Abstract

BACKGROUND:
The age of onset of cluster headache (CH) attacks most commonly is between 20 and 40 years old, although CH has been reported in all age groups. There is increasing evidence of CH with early or late onset and a different course of the disorder. The aim of the study was to analyze the influence of the age of onset on clinical features, disorder course, and therapy effectiveness in CH patients.

METHODS:
A retrospective and cross-sectional analysis was performed on 182 CH patients divided into three groups according to the age of onset. The first group consisted of patients with the first CH attack before 20 years of age, the second group was patients with age of onset between 20 and 40 years of age, and the third group was patients with age of onset after 40 years of age. Demographic data, features of CH periods and attacks, and the response to standardized treatment were compared among the groups.

RESULTS:
Patients with CH onset after 40 years of age reported a lower number of autonomic features and less frequently had conjunctival injection and nasal congestion/rhinorrhea phenomena during their attacks. Diagnostic delay was the longest in the patients with CH onset before 20 years of age.

CONCLUSION:
The influence of the age of onset of CH is intriguing for further studies and could possibly extend the knowledge about CH pathophysiology. From a clinical point of view, the differences in CH presentation are insufficient to preclude a correct diagnosis and treatment because the same criteria could be applied regardless of patient age.

KEYWORDS: Cluster headache, age at onset, clinical presentation PMID: 24445197

Sleep needs and headache

Cephalalgia. 2013 Dec 23.

Sleep quality, arousal and pain thresholds in tension-type headache: A blinded controlled polysomnographic study.

Engstrøm M, Hagen K, Bjørk M, Stovner LJ, Stjern M, Sand T.
Author information

Abstract

INTRODUCTION:
We aimed to compare subjective and objective sleep quality in tension-type headache (TTH) patients and to evaluate the relationship between sleep quality and pain thresholds (PT) in controls and TTH patients.

METHODS:
A blinded cross-sectional study where polysomnography (PSG) and PT (to pressure, heat and cold) measurements were done in 20 patients with TTH (eight episodic (ETTH) and twelve chronic (CTTH) TTH) and 29 healthy controls. Sleep diaries and questionnaires were applied.

RESULTS:
TTH patients had more anxiety ($P = 0.001$), insomnia ($P < 0.0005$), daytime tiredness ($P < 0.0005$) and reduced subjective sleep quality ($P < 0.0005$) compared to healthy controls. Sleep diaries revealed more long awakenings in TTH ($P = 0.01$) but no total sleep-time differences. TTH patients had more slow-wave sleep ($P = 0.002$) and less fast arousals ($P = 0.004$) in their PSGs. CTTH subjects had lower pressure PT ($P = 0.048$) and more daytime sleepiness than the controls ($P = 0.039$). Among TTH lower cold PT (CPT) correlated inversely with light sleep (N1) ($R = -0.49$, $P = 0.003$) while slow arousals correlated inversely with headache-frequency ($R = -0.64$, $P = 0.003$).

CONCLUSIONS:
We hypothesize that TTH patients need more sleep than healthy controls and might be relatively sleep deprived. Inadequate sleep may also contribute to increased pain sensitivity and headache frequency in TTH.

KEYWORDS: Tension-type headache, arousals, pain thresholds, polysomnography, sleep
PMID: 24366979

CONCUSSIONS

Coach's knowledge

Br J Sports Med. 2014 Jan;48(2):119-24. doi: 10.1136/bjsports-2013-092785. Epub 2013 Sep 16.

Knowledge about sports-related concussion: is the message getting through to coaches and trainers?

White PE, Newton JD, Makdissi M, Sullivan SJ, Davis G, McCrory P, Donaldson A, Ewing MT, Finch CF.

Author information

Abstract

AIM:

The need for accurate diagnosis and appropriate return-to-play decisions following a concussion in sports has prompted the dissemination of guidelines to assist managing this condition. This study aimed to assess whether key messages within these guidelines are reflected in the knowledge of coaches and sports trainers involved in community sport.

METHODS:

An online knowledge survey was widely promoted across Australia in May-August 2012 targeting community Australian Football (AF) and Rugby League (RL) coaches and sports trainers. 260 AF coaches, 161 AF sports trainers, 267 RL coaches and 228 RL sports trainers completed the survey. Knowledge scores were constructed from Likert scales and compared across football codes and respondent groups.

RESULTS:

General concussion knowledge did not differ across codes but sports trainers had higher levels than did coaches. There were no significant differences in either concussion symptoms or concussion management knowledge across codes or team roles. Over 90% of respondents correctly identified five of the eight key signs or symptoms of concussion. Fewer than 50% recognised the increased risk of another concussion following an initial concussion. Most incorrectly believed or were uncertain that scans typically show damage to the brain after a concussion occurs. Fewer than 25% recognised, and >40% were uncertain that younger players typically take longer to recover from concussion than adults.

CONCLUSIONS:

The key messages from published concussion management guidelines have not reached community sports coaches and sports trainers. This needs to be redressed to maximise the safety of all of those involved in community sport.

KEYWORDS: Concussion, Head injuries PMID: 24043666

Systematic review

Sports Med. 2014 Jan 9.

Assessment, Management and Knowledge of Sport-Related Concussion: Systematic Review.

King D, Brughelli M, Hume P, Gissane C.
Author information

Abstract

BACKGROUND:
Sport-related concussions are a subset of mild traumatic brain injuries and are a concern for many sporting activities worldwide.

OBJECTIVE:
To review and update the literature in regard to the history, pathophysiology, recognition, assessment, management and knowledge of concussion.

METHODS:
Searches of electronic literature databases were performed to identify studies published up until April 2013.

RESULTS:
292 publications focussing on concussion met the inclusion criteria, and so they were quality rated and reviewed.

CONCLUSION:
Concussion is hard to recognize and diagnose. Initial sideline assessment via the Sports Concussion Assessment Tool 3 (SCAT3), Child-SCAT3 or King-Devick test should be undertaken to identify athletes with concussion as part of a continuum of assessment modalities and athlete management. Sports medicine practitioners should be cognisant of the definition, extent and nature of concussion, and should work with coaches, athletes and trainers to identify and manage concussions. The most common reason for variations in management of concussion is lack of awareness of-and confusion about-the many available published guidelines for concussion. Future research should focus on better systems and tools for recognition, assessment and management of concussion. Sport participants' knowledge of concussion should be evaluated more rigorously, with interventions for sports where there is little knowledge of recognition, assessment and appropriate management of concussion.

PMID: 24403125

% of concussions

Clin J Sport Med. 2014 Jan;24(1):76-9. doi: 10.1097/01.jsm.0000432853.77520.3d.

Concussion reporting rates at the conclusion of an intercollegiate athletic career.

Llewellyn T, Burdette GT, Joyner AB, Buckley TA.
Author information

Abstract

OBJECTIVE:
The purpose of this study was to explore the current reported, unreported, and potentially unrecognized concussion rates among collegiate student-athletes who have completed their collegiate athletic career.

DESIGN:
Retrospective survey.

SETTING:
College and University athletic training rooms.

PARTICIPANTS:
One hundred sixty-one collegiate student-athletes (56.5% women; aged 21.5 ± 1.3; 3.7 ± 1.0 years of collegiate athletic experience) from 10 institutions who had either completed their intercollegiate athletic eligibility or were no longer participating.

MAIN OUTCOME MEASURES:
The self-reported concussion rate, the unreported rate and reasons, and the potentially unrecognized concussion rate.

RESULTS:
The self-reported concussion rate was 33.5% (54/161), and 22.2% (12) self-reported at least 3 concussions. The unreported rate was 11.8% (19/161), and the potentially unrecognized rate was 26.1% (42/161) with the most common unrecognized symptom being "knocked silly/seen stars" (23.6% [38/161]).

CONCLUSIONS:
Overall, 49.7% of all respondents (80/161) reported 1 acknowledged, unreported, or potential concussion. The unreported rate was lower than previous high school studies; however, the potentially unrecognized rate remains high and should be clinically concerning. These findings suggest educational interventions targeting collegiate student-athletes should remain and continue to focus on identifying concussion symptoms and dispelling the common misconception that "bell ringers" and "dings" are not concussions.

PMID: 24157468

Football long-term impact

Br J Sports Med. 2014 Jan;48(2):159-61. doi: 10.1136/bjsports-2013-092758. Epub 2013 Sep 11.

Heading in football, long-term cognitive decline and dementia: evidence from screening retired professional footballers.

Vann Jones SA, Breakey RW, Evans PJ.
Author information

Abstract

BACKGROUND:
Heading impairs cognition in the short and medium-terms; however, little is known about the long-term consequences. This study aimed to investigate the hypothesis that chronic low-level head trauma is associated with persistent cognitive decline.

METHODS:
All members of Former Player Associations (FPAs) from four professional football clubs in the UK were contacted to participate in the study. Participants were required to complete a self-assessed test of cognition, the Test Your Memory questionnaire. Further information was collected from respondents in order to analyse the potential effect of a number of variables on cognition.

RESULTS:
10 of 92 respondents (10.87%) screened positive for possible mild cognitive impairment (MCI) or dementia. There was no association between low-risk and high-risk playing positions (HR = 0.40, p = 0.456) or length of playing career (HR = 1.051 95% CI 0.879 to 1.257, p = 0.586) and a positive screening result. Age was a risk factor (HR = 1.137 per additional year, 95% CI 1.030 to 1.255, p < 0.05), although this was not significantly different from the population prevalence across age groups.

CONCLUSIONS:
These results suggest that once a player ends their playing career, their risk of harm falls in line with the population, suggesting either that changes are reversible or that heading may not be as harmful as commonly thought. Future longitudinal studies of large numbers of professional football players are needed to support the findings from this study.

KEYWORDS: Aging, Concussion, Epidemiology, Neurology, Soccer PMID: 24026299

SHOULDER GIRDLE

Scapula position overhead athletes

Int J Sports Med. 2014 Jan;35(1):75-82. doi: 10.1055/s-0033-1343409. Epub 2013 Jul 3.

Does scapular positioning predict shoulder pain in recreational overhead athletes?

Struyf F1, Nijs J2, Meeus M3, Roussel NA4, Mottram S5, Truijen S6, Meeusen R7.
Author information

Abstract

The objective of this prospective study is to investigate possible scapular related risk factors for developing shoulder pain.

Therefore, a 2-year follow-up study in a general community sports centre setting was conducted. A sample of convenience of 113 recreational overhead athletes (59 women and 54 men) with a mean age of 34 (17-64; SD 12) years were recruited. At baseline, visual observation for scapular dyskinesis, measured scapular protraction, upward scapular rotation and dynamic scapular control were evaluated. 22% (n=25) of all athletes developed shoulder pain during the 24 months following baseline assessment.

The Mean Shoulder Disability Questionnaire (SDQ) score for the painful shoulders was 34.8 (6.3-62.5; SD 17.4). None of the scapular characteristics predicted the development of shoulder pain. However, the athletes that developed shoulder pain demonstrated significantly less upward scapular rotation at 45° (p=0.010) and 90° (p=0.016) of shoulder abduction in the frontal plane at baseline in comparison to the athletes that remained pain-free.

In conclusion, although these scapular characteristics are not of predictive value for the development of shoulder pain, this study increases our understanding of the importance of a scapular upward rotation assessment among recreational overhead athletes.

PMID: 23825003

GLENOHUMERAL/SHOULDER

Superior capsule stability

J Shoulder Elbow Surg. 2013 Dec 31. pii: S1058-2746(13)00509-0. doi: 10.1016/j.jse.2013.09.025.

Role of the superior shoulder capsule in passive stability of the glenohumeral joint.

Ishihara Y1, Mihata T2, Tamboli M3, Nguyen L3, Park KJ3, McGarry MH3, Takai S4, Lee TQ3.
Author information

Abstract

BACKGROUND:
The shoulder capsule is the main static stabilizer of the glenohumeral joint. However, few studies specifically address the function of the superior shoulder capsule, which is usually damaged in patients with complete rotator cuff tears. Therefore, the purpose of this study was to determine the biomechanical contribution of the superior shoulder capsule to passive stability of the glenohumeral joint.

METHODS:
Seven cadaveric shoulders were tested with a custom testing system. Glenohumeral translations, subacromial contact pressure, and glenohumeral external and internal rotations were quantified at 5°, 30°, and 60° of glenohumeral abduction. Data were compared among 3 conditions: (1) intact superior capsule, (2) after detaching the superior capsule from the greater tuberosity (tear model), and (3) after complete removal of the superior capsule from the greater tuberosity to the superior glenoid (defect model).

RESULTS:
A tear of the superior capsule significantly ($P < .05$) increased anterior and inferior translations compared with those in the intact capsule. Creation of a superior capsular defect significantly ($P < .05$) increased glenohumeral translation in all directions, subacromial contact pressure at 30° of glenohumeral abduction, and external and internal rotations compared with those of the intact capsule.

CONCLUSION:
The superior shoulder capsule plays an important role in passive stability of the glenohumeral joint. A tear in the superior capsule at the greater tuberosity, which may be seen with partial rotator cuff tears, increased anterior and inferior translations. A defect in the superior capsule, seen in massive cuff tears, increased glenohumeral translations in all directions.

KEYWORDS: Basic Science Study, Biomechanics, Capsule, defect, shoulder, stability, superior, tear PMID: 24388150

HAGL lesions

Skeletal Radiol. 2014 Mar;43(3):307-13. doi: 10.1007/s00256-013-1778-1. Epub 2013 Dec 15.

Prevalence of HAGL lesions and associated abnormalities on shoulder MR examination.

Magee T.

OBJECTIVE:
Humeral avulsion of the glenohumeral ligament (HAGL) is an uncommon shoulder injury. We report the prevalence of HAGL lesions and other associated shoulder injuries in a large series of shoulder MR examinations. All results were correlated with surgery.

MATERIALS AND METHODS:
MR reports of 1,000 consecutive conventional shoulder MR exams performed on patients with shoulder pain were reviewed in our information system for the word HAGL. A total of 743 patients went on to surgery. There were 23 HAGL lesions reported at surgery. Those 23 examinations were reviewed retrospectively in consensus by two musculoskeletal radiologists. Scans were assessed for HAGL lesions, full or partial thickness supraspinatus, infraspinatus or subscapularis tendon tears, superior labral anterior posterior (SLAP) tears, anterior or posterior labral tears, and Hill-Sachs lesions.

RESULTS:
All 23 patients had HAGL lesions at surgery. Sixteen HAGL lesions were seen on prospective MR reading and 17 HAGL lesions were seen on retrospective MR consensus reading. Six HAGL lesions were not seen on retrospective consensus reading. Sixteen patients had Hill-Sachs deformities, ten had subscapularis tendon tears, five had supraspinatus tendon tears, six had superior labral tearing, and six had anterior labral tears. The above findings were confirmed on arthroscopy.

CONCLUSIONS:
In this series, there was a 1.6 % prevalence on all MR examinations, and prevalence of 2.1 % seen on MR examination for those who went to surgery. Common injuries associated with HAGL lesions are Hill-Sachs deformities and subscapularis tendon tears. Anterior labral tears were seen in only six cases despite Hill-Sachs deformities in 16 patients. In patients with Hill-Sachs deformities without anterior labral tears, one must carefully assess for the presence of a HAGL lesion.

PMID: 24337489

Conservative care of pain

Cochrane Database Syst Rev. 2013 Dec 12;12:CD008742. doi: 10.1002/14651858.CD008742.pub2.

Conservative interventions for treating work-related complaints of the arm, neck or shoulder in adults. Verhagen AP, Bierma-Zeinstra SM, Burdorf A, Stynes SM, de Vet HC, Koes BW. **BACKGROUND:** Work-related upper limb disorder (WRULD), repetitive strain injury (RSI), occupational overuse syndrome (OOS) and work-related complaints of the arm, neck or shoulder (CANS) are the most frequently used umbrella terms for disorders that develop as a result of repetitive movements, awkward postures and impact of external forces such as those associated with operating vibrating tools. Work-related CANS, which is the term we use in this review, severely hampers the working population.

OBJECTIVES: To assess the effects of conservative interventions for work-related complaints of the arm, neck or shoulder (CANS) in adults on pain, function and work-related outcomes.
DATA COLLECTION AND ANALYSIS: Two review authors independently selected trials for inclusion, extracted data and assessed risk of bias of the included studies. When studies were sufficiently similar, we performed statistical pooling of reported results.
MAIN RESULTS: We included 44 studies (62 publications) with 6,580 participants that evaluated 25 different interventions. We categorised these interventions according to their working mechanisms into exercises, ergonomics, behavioural and other interventions.Overall, we judged 35 studies as having a high risk of bias mainly because of an unknown randomisation procedure, lack of a concealed allocation procedure, unblinded trial participants or lack of an intention-to-treat analysis.We found very low-quality evidence showing that exercises did not improve pain in comparison with no treatment (five studies, standardised mean difference (SMD) -0.52, 95% confidence interval (CI) -1.08 to 0.03), or minor intervention controls (three studies, SMD -0.25, 95% CI -0.87 to 0.37) or when provided as additional treatment (two studies, inconsistent results) at short-term follow-up or at long-term follow-up. Results were similar for recovery, disability and sick leave. Specific exercises led to increased pain at short-term follow-up when compared with general exercises (four studies, SMD 0.45, 95% CI 0.14 to 0.75)We found very low-quality evidence indicating that ergonomic interventions did not lead to a decrease in pain when compared with no intervention at short-term follow-up (three studies, SMD -0.07, 95% CI -0.36 to 0.22) but did decrease pain at long-term follow-up (four studies, SMD -0.76, 95% CI -1.35 to -0.16). There was no effect on disability but sick leave decreased in two studies (risk ratio (RR) 0.48, 95% CI 0.32 to 0.76). None of the ergonomic interventions was more beneficial for any outcome measures when compared with another treatment or with no treatment or with placebo.Behavioural interventions had inconsistent effects on pain and disability, with some subgroups showing benefit and others showing no significant improvement when compared with no treatment, minor intervention controls or other behavioural interventions.In the eight studies that evaluated various other interventions, there was no evidence of a clear beneficial effect of any of the interventions provided.
AUTHORS' CONCLUSIONS: We found very low-quality evidence indicating that pain, recovery, disability and sick leave are similar after exercises when compared with no treatment, with minor intervention controls or with exercises provided as additional treatment to people with work-related complaints of the arm, neck or shoulder. Low-quality evidence also showed that ergonomic interventions did not decrease pain at short-term follow-up but did decrease pain at long-term follow-up. There was no evidence of an effect on other outcomes. For behavioural and other interventions, there was no evidence of a consistent effect on any of the outcomes.Studies are needed that include more participants, that are clear about the diagnosis of work-relatedness and that report findings according to current guidelines.
PMID: 24338903

Functional Tests

BMC Musculoskelet Disord. 2014 Jan 3;15(1):1.

Closed Kinetic Chain Upper Extremity Stability Test (CKCUES Test): a reliability study in persons with and without shoulder impingement syndrome.

Tucci H, Martins J, Sposito GD, de Oliveira AS.

Abstract

BACKGROUND::
The Close Kinetic Chain Upper Extremity Stability Test (CKCUES test) is a low cost shoulder functional test that could be considered as a complementary and objective clinical outcome for shoulder performance evaluation. However, its reliability was tested only in recreational athletes' males and there are no studies comparing scores between sedentary and active samples. The purpose was to examine inter and intrasession reliability of CKCUES Test for samples of sedentary male and female with (SIS), for samples of sedentary healthy male and female, and for male and female samples of healthy upper extremity sport specific recreational athletes. Other purpose was to compare scores within sedentary and within recreational athletes samples of same gender.

METHOD: S:
A sample of 108 subjects with and without SIS was recruited. Subjects were tested twice, seven days apart. Each subject performed four test repetitions, with 45seconds of rest between them. The last three repetitions were averaged and used to statistical analysis. Intraclass Correlation Coefficient ICC2,1 was used to assess intrasession reliability of number of touches score and ICC2,3 was used to assess intersession reliability of number of touches, normalized score, and power score. Test scores within groups of same gender also were compared. Measurement error was determined by calculating the Standard Error of the Measurement (SEM) and Minimum detectable change (MDC) for all scores.

RESULTS::
The CKCUES Test showed excellent intersession reliability for scores in all samples. Results also showed excellent intrasession reliability of number of touches for all samples. Scores were greater in active compared to sedentary, with exception of power score. All scores were greater in active compared to sedentary and SIS males and females. SEM ranged from 1.45 to 2.76 touches (based on a 95% CI) and MDC ranged from 2.05 to 3.91(based on a 95% CI) in subjects with and without SIS. At least 3 touches are needed to be considered a real improvement on CKCUES Test scores.

CONCLUSION:
Results suggest CKCUES Test is a reliable tool to evaluate upper extremity functional performance for sedentary, for upper extremity sport specific recreational, and for sedentary males and females with SIS.

PMID: 2438719

Central sensitization

Clin J Pain. 2014 Feb;30(2):143-51. doi: 10.1097/AJP.0b013e318287a2a4.

Experimental pain responses support peripheral and central sensitization in patients with unilateral shoulder pain.

Coronado RA, Simon CB, Valencia C, George SZ.
Author information

*Department of Physical Therapy, College of Public Health and Health Professions ‡Center for Pain Research and Behavioral Health, University of Florida, FL †Department of Applied Medicine and Rehabilitation, Indiana State University, IN.

Abstract

OBJECTIVE:
The aims of this study were to (1) examine the pattern of experimental pain responses in the affected and nonaffected extremities in patients with shoulder pain and (2) explore the intraindividual association between sensitization states derived from experimental pain testing.

METHODS:
Experimental pain responses from 58 patients with shoulder pain (17 women, aged 18 to 52 y) were compared with those from 56 age-matched and sex-matched pain-free volunteers (16 women, aged 21 to 58 y). Experimental pain responses included pressure pain threshold (PPT), thermal pain threshold and tolerance, and suprathreshold heat pain response. Comparisons were made between the affected and nonaffected extremities of clinical participants and the average response of extremities in control participants. Peripheral and central sensitization indexes were computed for clinical participants using standardized scores and percentile cutoffs on the basis of the data from the control sample. Experimental pain responses in clinical participants observed beyond the 25th and 75th percentile of control sample responses were used for investigation of intraindividual association of sensitization states.

RESULTS:
PPT at the acromion and masseter on the affected side of clinical participants were diminished compared with that on their nonaffected side ($P<0.015$). Bilateral sensitivity in clinical participants was noted for PPT at the acromion and suprathreshold heat pain response ($P<0.015$). Peripheral and central sensitization indexes demonstrated that individuals with shoulder pain present with variable patterns of peripheral and central sensitization.

CONCLUSIONS:
Collectively, experimental pain responses supported peripheral and central sensitization in response to pressure and thermal stimuli. No clear association was made between individuals exhibiting peripheral or central sensitization, thus suggesting heterogeneity in pain processing in this clinical population.

PMID: 23619203

FROZEN SHOULDER

RADIOGRAPHIC

Eur J Radiol. 2014 Feb;83(2):345-8. doi: 10.1016/j.ejrad.2013.10.017. Epub 2013 Oct 29.

MRI of adhesive capsulitis of the shoulder: Distension of the bursa in the superior subscapularis recess is a suggestive sign of the pathology.

Carbone S1, Napoli A2, Gumina S3.
Author information

Abstract

OBJECTIVE:
To evaluate the diagnostic values of the superior subscapularis recess sign in patients with shoulder adhesive capsulitis. The sign consists in evaluating in MRI of the shoulder the presence of fluid distension of the bursa in the superior subscapularis recess.

MATERIALS AND METHODS:
We evaluated MRI of 165 shoulders in 48 consecutive patients with a diagnosis of shoulder adhesive capsulitis in the freezing phase (group I), in 49 short-wide superior cuff tear (group II) and in 65 controls (group III) between 2010 and 2013. On the T2 weighted images, we evaluated the presence of an high intensity signal within the superior subscapularis recess, consistent with fluid distension of the bursa.

RESULTS:
The sign was found in 43/48 patients (89.58%) with shoulder adhesive capsulitis in 3/49 (6.12%) patients with superior cuff tear and in 1/65 controls (1.53%) ($p<0.001$). The mean diagnostic values were: sensibility 0.91; specificity 0.96-0.98; positive predictive value 0.93-0.97; negative predictive value 0.92-0.94; likelihood ratios for an abnormal test result 15.16-60.6; likelihood ratios for a normal test result 0.086-0.095.

CONCLUSION:
For the orthopedic surgeon or the clinician, the sign is useful to confirm in MRI the clinical diagnosis of shoulder adhesive capsulitis; accordingly, the radiologist should describe and relate this sign to the pathology in the report, looking eventually for further typical sign of shoulder adhesive capsulitis.

KEYWORDS: Diagnosis, Freezing phase, Frozen shoulder, Shoulder adhesive capsulitis, Subscapularis recess PMID: 24246364

ROTATOR CUFF

Impact of massive tear

Relationship between massive chronic rotator cuff tear pattern and loss of active shoulder range of motion

Journal of Shoulder and Elbow Surgery, 01/17/2014 **Evidence Based Medicine**
Collin P, et a

Background

Management of massive chronic rotator cuff tears remains controversial, with no clearly defined clinical presentation as yet. The purpose of the study was to evaluate the effect of tear size and location on active motion in patients with chronic and massive rotator cuff tears with severe muscle degeneration.

Methods

One hundred patients with massive rotator cuff tears accompanied by muscle fatty infiltration beyond Goutallier stage 3 were prospectively included in this study. All patients were divided into 5 groups on the basis of tear pattern (supraspinatus, superior subscapularis, inferior subscapularis, infraspinatus, and teres minor). Active range of shoulder motion was assessed in each group and differences were analyzed.

Results

Active elevation was significantly decreased in patients with 3 tear patterns involved. Pseudoparalysis was found in 80% of the cases with supraspinatus and complete subscapularis tears and in 45% of the cases with tears involving the supraspinatus, infraspinatus, and superior subscapularis. Loss of active external rotation was related to tears involving the infraspinatus and teres minor; loss of active internal rotation was related to tears of the subscapularis.

Conclusions

This study revealed that dysfunction of the entire subscapularis and supraspinatus or 3 rotator cuff muscles is a risk factor for pseudoparalysis. For function to be preserved in patients with massive chronic rotator cuff tears, it may be important to avoid fatty infiltration with anterior extension into the lower subscapularis or involvement of more than 2 rotator cuff muscles.

Conservative care vs. surgical repair

Bone Joint J. 2014 Jan;96(1):75-81. doi: 10.1302/0301-620X.96B1.32168.

Treatment of non-traumatic rotator cuff tears: A randomised controlled trial with one-year clinical results.

Kukkonen J, Joukainen A, Lehtinen J, Mattila KT, Tuominen EK, Kauko T, Äärimaa V.
Author information

Abstract

We have compared three different methods of treating symptomatic non-traumatic tears of the supraspinatus tendon in patients above 55 years of age.

A total of 180 shoulders (173 patients) with supraspinatus tendon tears were randomly allocated into one of three groups (each of 60 shoulders); physiotherapy (group 1), acromioplasty and physiotherapy (group 2) and rotator cuff repair, acromioplasty and physiotherapy (group 3). The Constant score was assessed and followed up by an independent observer pre-operatively and at three, six and twelve months after the intervention. Of these, 167 shoulders were available for assessment at one year (follow-up rate of 92.8%). There were 55 shoulders in group 1 (24 in males and 31 in females, mean age 65 years (55 to 79)), 57 in group 2 (29 male and 28 female, mean age 65 years (55 to 79)) and 55 shoulders in group 3 (26 male and 29 female, mean age 65 years (55 to 81)). There were no between-group differences in the Constant score at final follow-up: 74.1 (sd 14.2), 77.2 (sd 13.0) and 77.9 (sd 12.1) in groups 1, 2 and 3, respectively ($p = 0.34$). The mean change in the Constant score was 17.0, 17.5, and 19.8, respectively ($p = 0.34$).

These results suggest that at one-year follow-up, operative treatment is no better than conservative treatment with regard to non-traumatic supraspinatus tears, and that conservative treatment should be considered as the primary method of treatment for this condition. Cite this article: Bone Joint J 2014;96-B:75-81.

KEYWORDS: Acromioplasty, Constant score, Non-traumatic rotator cuff tear, Physiotherapy, Rotator cuff, Rotator cuff repair PMID: 24395315

WRIST AND HAND

Lumbricals

J Hand Surg Am. 2014 Jan;39(1):149-55. doi: 10.1016/j.jhsa.2013.06.029.

A biomechanical and evolutionary perspective on the function of the lumbrical muscle.

Wang K1, McGlinn EP1, Chung KC2.
Author information

Abstract

The lumbrical muscles of the hand originate from the flexor digitorum profundus tendons and insert onto the lateral band of the extensor tendons.

Owing to these movable attachments, the function of this muscle is difficult to visualize. To better determine the function of this muscle, we considered its relative anatomy, biomechanical characteristics, and evolution. With the smallest physiological cross-sectional area in the upper extremity, the lumbrical muscles have weak motor function, which is only 1/10 of the interosseous muscle. Because they are spindle rich, the lumbrical muscles play an important role in the sensory feedback of the distal interphalangeal, proximal interphalangeal, and metacarpophalangeal joints of the fingers. The first 2 lumbrical muscles have lower variation in anatomy and higher density of muscle spindles compared to the ulnar 2 lumbricals. In addition, the index and middle finger lumbrical muscles are innervated by the median nerve, which also innervates the thenar muscles of the thumb.

Therefore, it is possible that the first 2 lumbricals are functionally more important than the 2 ulnar lumbricals, specifically for precision pinch movements.

KEYWORDS: Intrinsic hand muscles, lumbrical muscle, muscle spindles PMID: 24369943

HIP

Lig. Teres tear test

Am J Sports Med. 2013 Nov 26.

The Ligamentum Teres Test: A Novel and Effective Test in Diagnosing Tears of the Ligamentum Teres.

O'Donnell J, Economopoulos K, Singh P, Bates D, Pritchard M.
Author information

Abstract

BACKGROUND: A ligamentum teres (LT) injury is a common finding at the time of hip arthroscopic surgery in patients with chronic groin and hip pain; however, LT tears have been difficult to identify before surgery. There have been no unique features identified on history assessment, physical examination, or imaging that reliably identify injuries of the LT preoperatively.

PURPOSE: To report a new clinical examination to assess the presence of an LT tear: the LT test.

STUDY DESIGN: Cohort study (diagnosis); Level of evidence, 2.

METHODS: The study consisted of 75 patients undergoing hip arthroscopic surgery for multiple lesions. Each patient was evaluated by 2 independent examiners using the LT test, leading to a total of 150 tests being performed. The LT test is conducted with the hip flexed at 70° and 30° short of full abduction; the hip is then internally and externally rotated to its limits of motion. Pain on either internal or external rotation is consistent with a positive LT test result. Hip arthroscopic surgery was then performed and all intra-articular abnormalities noted. Arthroscopic images were taken of each LT and examined by a third independent examiner who determined the presence or absence of a tear. Clinical examination findings were compared with the arthroscopic findings to determine the sensitivity, specificity, and positive and negative predictive values. In addition, the presence of intra-articular pathological lesions was compared with the test results to determine if there was a correlation between the presence of an intra-articular pathological abnormality and a positive LT test result.

RESULTS: Of the 150 examinations performed, the test result was positive 55% of the time (77 examinations). The sensitivity and specificity of the test were 90% and 85%, respectively. The positive predictive value was 84%, and the negative predictive value was 91%. The presence of an LT tear, pincer lesion, and labral tear that required repair was associated with a positive LT test result. The κ coefficient for interobserver reliability was .80.

CONCLUSION: The LT test is an effective way of assessing the presence of LT tears with moderate to high interobserver reliability. In addition to an LT tear, the presence of a pincer lesion or labral tear requiring repair are also associated with a positive LT test result.

KEYWORDS: LT test, groin pain, ligamentum teres, tears PMID: 24280307

Replacements

Functional exercise

Clin Rehabil. 2014 Jan 23.

Task-oriented exercises and early full weight-bearing contribute to improving disability after total hip replacement: a randomized controlled trial.

Monticone M, Ambrosini E, Rocca B, Lorenzon C, Ferrante S, Zatti G.
Author information

1Physical Medicine and Rehabilitation Unit, Scientific Institute of Lissone Salvatore Maugeri Foundation IRCCS, Monza Brianza, Italy.

Abstract

Objective: To evaluate the efficacy of an in-hospital programme based on task-oriented exercises associated with early full weight-bearing in patients with multiple comorbidities undergoing total hip replacement.

Design: Randomized controlled trial.

Setting: Specialised rehabilitation centre.

Subjects: A total of 100 patients (mean age of 69 (8) years; 40 males, 60 females).

Interventions:

The experimental group underwent task-oriented exercises and was encouraged to abandon any walking aids by the end of their in-hospital stay. The control group underwent open chain kinetic exercises, and was recommended to use partial weight-bearing and walking aids until three months after surgery. Both groups individually followed programmes of 90-minute sessions five times a week for three weeks.

Outcome measures: Western Ontario and McMaster Universities Osteoarthritis Index, Pain Numerical Rating Scale, Functional Independence Measure, and Short-Form Health Survey. The participants were evaluated before, after training, and after a further 12 months.

Results: There were no significant between-group differences at baseline. After training, a between-group difference of 12 points was found for the Western Ontario and McMaster Universities Osteoarthritis Index - functional subscale, indicating a clinically tangible treatment effect on disability. The Functional Independence Measure increased by 31 and 15 points in the experimental and control group, respectively. A linear mixed model revealed significant effects of time, group, and time by group interaction on disability, pain, activities of daily living, and most of the physical quality of life domains.

Conclusion: Task-oriented exercises associated with early full weight-bearing improve disability, pain, activities of daily living, and quality of life after total hip replacement.

KEYWORDS: Arthroplasty, hip, rehabilitation, replacement, task-oriented exercises PMID: 24459172

Jogging

Am J Sports Med. 2013 Oct 10.

Jogging After Total Hip Arthroplasty.

Abe H, Sakai T, Nishii T, Takao M, Nakamura N, Sugano N.

Abstract

BACKGROUND:Jogging has been classified as a high-impact sport, and jogging after total hip arthroplasty (THA) has not been well documented.

PURPOSE:To investigate the participation rate for postoperative jogging as well as jogging parameters and the influence of jogging on implant stability and bearing wear.

STUDY DESIGN:Case-control study; Level of evidence, 3.

METHODS:Included in this study were 804 hips in 608 patients (85 men, 523 women) who underwent THA between 2005 and 2011 with follow-up longer than 1 year. The mean patient age was 62 years (range, 26-98 years), and mean follow-up duration was 4.8 years (range, 2.3-7.8 years). Hip resurfacing arthroplasty (HRA) was performed in 81 patients and conventional THA in 527 patients. During routine postsurgical visits, patients were given a questionnaire concerning preoperative and postoperative jogging routines. For joggers, frequency, distance, duration, and velocity of jogging were recorded. Patients who did not jog postoperatively were asked to provide reasons for not jogging. Radiographs concerning implant migration and polyethylene wear were evaluated with specialized software, and serum cobalt and chromium ion concentrations were investigated for patients with metal-on-metal articulation.

RESULTS:A total of 33 patients (5.4%) performed jogging preoperatively, and 23 patients (3.8%) performed jogging postoperatively. Of the 23 who jogged postoperatively, conventional THA was performed in 13 patients and HRA in 10 patients. Postoperatively, joggers trained a mean of 4 times (range, 1-7 times) per week, covering a mean distance of 3.6 km (range, 0.5-15 km) in a mean time of 29 minutes (range, 5-90 minutes) per session and at a mean speed of 7.7 km/h (range, 3-18 km/h). No patient complained of pain or showed serum cobalt and chromium ion elevation greater than 7 ppb. No hip showed loosening, abnormal component migration, or excessive wear at a mean 5-year follow-up. There were 74 postoperative non-joggers with an interest in jogging. The reasons given for avoiding jogging included anxiety (45 patients; 61%); impossible because of several reasons, including pain, decreased range of motion, and muscle weakness (18 patients; 24%); and lumbar or knee pain (11 patients; 15%). Multivariate analysis revealed that male sex and a history of preoperative jogging demonstrated significant relationships with postoperative jogging.

CONCLUSION: A total of 3.8% of THA patients participated in postoperative jogging. Short-term postoperative follow-up did not identify any negative influence of jogging on implant survival.

KEYWORDS: clinical results, hip resurfacing arthroplasty, jogging, sports, total hip arthroplasty
PMID: 24114754

OA

Impact of barometric pressure on symptoms

Pain. 2014 Jan 22. pii: S0304-3959(14)00026-8. doi: 10.1016/j.pain.2014.01.018.

Associations between weather conditions and clinical symptoms in patients with hip osteoarthritis: a two-year cohort study.

Dorleijn DM1, Luijsterburg PA2, Burdorf A3, Rozendaal RM2, Verhaar JA4, Bos PK4, Bierma-Zeinstra SM5.

The goal was to assess whether there is an association between ambient weather conditions and patients' clinical symptoms in patients with hip osteoarthritis (OA).

The design was a cohort study with a 2-year follow-up and 3-monthly measurements and prospectively collected data of weather variables.

The study population consisted of 222 primary care patients with hip OA. Weather variables included temperature, wind speed, total amount of sun hours, precipitation, barometric pressure, and relative humidity.

The primary outcomes were severity of hip pain and hip disability measured with the Western Ontario and McMasters University Osteoarthritis Index (WOMAC) pain and function subscales. Associations between hip pain and hip disability and the weather variables were assessed using crude and multivariate adjusted linear mixed-model analysis for repeated measurements. On the day of questionnaire completion, mean relative humidity was associated with WOMAC pain (estimate 0.1; 95%CI 0.0-0.2; p 0.02). Relative humidity contributed □1% to the explained within-patient variance and between-patient variance of the WOMAC pain score. Mean barometric pressure was associated with WOMAC function (estimate 0.1; 95%CI 0.0-0.1; p 0.02). Barometric pressure contributed □1% to the explained within-patient variance and between-patient variance of the WOMAC function score. The other weather variables were not associated with the WOMAC pain or function score.

Our results support the general opinion of OA patients that barometric pressure and relative humidity influences perceived OA symptoms. However, the contribution of these weather variables (□1%) to the severity of OA symptoms is not considered to be clinically relevant.

KNEE

Treatment of effusion

Knee Surg Sports Traumatol Arthrosc. 2013 Jan 19.

Effectiveness of aspiration in knee joint effusion management: a prospective randomized controlled study.

Paschos NK, Giotis D, Abuhemoud K, Georgoulis AD.
Author information

Abstract

PURPOSE:
Knee effusion is a common symptom in various knee disorders of both traumatic and non-traumatic aetiology. Although intra-articular aspiration is a widespread treatment approach, its beneficial effect has not been confirmed by a randomized controlled study. The purpose was to evaluate the effectiveness and safety of joint aspiration in acute knee effusion, in relation to traumatic or non-traumatic aetiology.

METHODS:
One hundred and sixty-seven consecutive patients with acute knee joint effusion were allocated in a randomized controlled fashion into two groups. In the first group, joint aspiration was performed, while in the second group, no aspiration was performed. Range of motion, pain relief, use of analgesics and oedema were evaluated post management. The Knee Society Score and the International Knee Documentation Committee Subjective Evaluation Form were also obtained. In addition, a subgroup analysis of our results in relation to the presence of trauma or not was performed.

RESULTS:
Aspiration exhibited a temporary improvement in all clinical parameters evaluated, especially in the post-traumatic effusion. However, this improvement lasted only for the first week, due to the early re-accumulation of the effusion. There was no difference between the different groups regarding the clinical outcome in neither trauma or non-trauma patients at the end of the follow-up period. Aspiration aided in earlier establishment of the diagnosis in the non-trauma cases of effusion.

CONCLUSIONS:
Aspiration resulted in only temporary improvement of the outcome in the treatment of traumatic or not traumatic knee effusion. Aspiration is suggested in effusions of unknown origin in order to establish the diagnosis and for immediate clinical relief. However, aspiration should be performed with consideration in the presence of trauma.

LEVEL OF EVIDENCE: Therapeutic study, Level I. PMID: 23334623

Neuromuscular changes with plyometrics

Int J Sports Med. 2014 Feb;35(2):101-19. doi: 10.1055/s-0033-1343401. Epub 2013 Jul 30.

Effect of plyometric training on neural and mechanical properties of the knee extensor muscles.

Behrens M, Mau-Moeller A, Bruhn S.
Author information

Abstract

This study investigated neuromuscular adaptations of the knee extensors after 8 weeks of plyometric training. 23 subjects were randomly assigned to an intervention group and a control group. We measured isometric maximum voluntary torque (iMVT), rate of torque development (RTD) and impulse (IMP) over different time intervals. The neural drive to muscles was estimated with the interpolated twitch technique and normalized root mean square of the EMG signal. Contractile properties, H reflexes as well as jump height in squat jump (SJ) and countermovement jump (CMJ) were evaluated. Neuromuscular testing was performed at 2 knee angles, i. e., 80° and 45° (0°=full extension). The iMVT at 80° knee flexion was 23.1 N · m (95% CI: 0.1-46.1 N · m, P=0.049) higher at post-test for the intervention group compared with controls. The same was true for RTD and IMP in the time interval 0-50 ms [308.7 N · m · s-1 (95% CI: 28.8-588.6 N · m · s-1, P=0.033) and 0.32 N · m · s (95% CI: 0.05-0.60 N · m · s, P=0.026), respectively]. These changes were accompanied by enhanced neural drive to the quadriceps muscle. Jump height in SJ and CMJ was higher at post-test for the intervention group compared with controls. Parameters at 45° knee flexion, contractile properties and evoked potentials did not differ between groups. Although hypertrophic changes were not measured, data suggest that the training regime probably induced mainly neural adaptations that were specifically related to the knee angle. The strength gains at 80° knee flexion likely contributed to the enhanced jump height in SJ and CMJ.

PMID: 23900900

Valgus and foot

Knee. 2013 Jan 3. pii: S0968-0160(12)00234-7. doi: 10.1016/j.knee.2012.12.002.

Knee rotation associated with dynamic knee valgus and toe direction.

Ishida T, Yamanaka M, Takeda N, Aoki Y.
Author information

Abstract

BACKGROUND:
Dynamic knee valgus contributes to injuries of the anterior cruciate ligament (ACL). However, it is unclear how the knee rotates during dynamic knee valgus. Knee rotation significantly affects ACL strain. To understand knee rotation during dynamic knee valgus should help the clinician evaluate dynamic alignment. The purpose of this study was to determine how the knee rotates during dynamic knee valgus and whether the knee rotation is affected by toe direction (foot rotation).

METHODS:
Sixteen females performed dynamic knee valgus in three toe directions (neutral, toe-out, and toe-in) while maintaining the knee flexion angle at 30°. The knee rotation angle was evaluated using a 7-camera motion analysis system. Knee rotation was compared between the start position and the dynamic knee valgus position, as well as among the three toe directions, using repeated measures ANOVA models.

RESULTS:
The knee significantly rotated externally in the dynamic knee valgus position compared with the start position in two toe directions (neutral and toe-out). A similar tendency was observed with the toe-in condition. Toe direction significantly affected the knee rotation angle. For toe-out and toe-in conditions, external and internal shifts of knee rotation compared with neutral were observed.

CONCLUSIONS:
The knee rotates externally during dynamic knee valgus, and the knee rotation is affected by toe direction.

CLINICAL RELEVANCE:
Because of knee abduction and external rotation, the ACL may impinge on the femoral condyle in the case of dynamic valgus, especially in the toe-out position.

PMID: 23290175

Depression and knee pain

Research article

Are depression, anxiety and poor mental health risk factors for knee pain? A systematic review

Pyae P Phyomaung, **Julia Dubowitz**, **Flavia M Cicuttini**, **Sanduni Fernando**, **Anita E Wluka**, **Paul Raaijmaakers**, **Yuanyuan Wang** and **Donna M Urquhart**

BMC Musculoskeletal Disorders 2014, **15**:10 doi:10.1186/1471-2474-15-10

Background

While it is recognized that psychosocial factors are important in the development and progression of musculoskeletal pain and disability, no systematic review has specifically focused on examining the relationship between psychosocial factors and knee pain. We aimed to systematically review the evidence to determine whether psychosocial factors, specifically depression, anxiety and poor mental health, are risk factors for knee pain.

Methods

Electronic searches of MEDLINE, EMBASE and PsycINFO were performed to identify relevant studies published up to August 2012 using MESH terms and keywords. We included studies that met a set of predefined criteria and two independent reviewers assessed the methodological quality of the selected studies. Due to the heterogeneity of the studies, a best evidence synthesis was performed.

Results

Sixteen studies were included in the review, of which 9 were considered high quality. The study populations were heterogeneous in terms of diagnosis of knee pain. We found a strong level of evidence for a relationship between depression and knee pain, limited evidence for no relationship between anxiety and knee pain, and minimal evidence for no relationship between poor mental health and knee pain.

Conclusions

Despite the heterogeneity of the included studies, these data show that depression plays a significant role in knee pain, and that a biopsychosocial approach to the management of this condition is integral to optimising outcomes for knee pain.

Fibular ligament

Knee Surg Sports Traumatol Arthrosc. 2014 Jan 14.

In situ forces and length patterns of the fibular collateral ligament under controlled loading: an in vitro biomechanical study using a robotic system.

Liu P, Wang J, Xu Y, Ao Y.
Author information

Abstract

PURPOSE:
The aim of this study was to determine the in situ forces and length patterns of the fibular collateral ligament (FCL) and kinematics of the knee under various loading conditions.

METHODS:
Six fresh-frozen cadaveric knees were used (mean age 46 ± 14.4 years; range 20-58). In situ forces and length patterns of FCL and kinematics of the knee were determined under the following loading conditions using a robotic/universal force-moment sensor testing system: no rotation, varus (10 Nm), external rotation (5 Nm), and internal rotation (5 Nm) at 0°, 15°, 30°, 60º, 90°, and 120° of flexion, respectively.

RESULTS:
Under no rotation loading, the distances between the centres of the FCL attachments decreased as the knee flexed. Under varus loading, the force in FCL peaked at 15° of flexion and decreased with further knee flexion, while distances remained nearly constant and the varus rotation increased with knee flexion. Using external rotation, the force in the FCL also peaked at 15° flexion and decreased with further knee flexion, the distances decreased with flexion, and external rotation increased with knee flexion. Using internal rotation load, the force in the FCL was relatively small across all knee flexion angles, and the distances decreased with flexion; the amount of internal rotation was fairly constant.

CONCLUSIONS:
FCL has a primary role in preventing varus and external rotation at 15° of flexion. The FCL does not perform isometrically following knee flexion during neutral rotation, and tibia rotation has significant effects on the kinematics of the FCL. Varus and external rotation laxity increased following knee flexion. By providing more realistic data about the function and length patterns of the FCL and the kinematics of the intact knee, improved reconstruction and rehabilitation protocols can be developed.

PMID: 24420605

Cartilage mechanics

J Orthop Sports Phys Ther 2013;43(12):881–890.

Quadriceps and Hamstrings Morphology Is Related to Walking Mechanics and Knee Cartilage MRI Relaxation Times in Young Adults

Authors: Deepak Kumar, Karupppasamy Subburaj, Wilson Lin, Dimitrios C. Karampinos, Charles E. McCulloch, Xiaojuan Li, Thomas M. Link, Richard B. Souza, Sharmila Majumdar

Study Design Controlled laboratory study using a cross-sectional design.

Objectives To analyze the relationship of quadriceps-hamstrings and medial-lateral quadriceps anatomical cross-sectional area (ACSA) ratios with knee loads during walking and articular and meniscal cartilage composition in young, healthy subjects.

Background Muscle forces affect knee loading during walking, but it is not known if muscle morphology is associated with walking mechanics and cartilage composition in young subjects.

Methods Forty-two knees from 27 young, healthy, active volunteers (age, 20–35 years; body mass index, <28 kg/m^2) underwent 3-T magnetic resonance imaging (MRI) and 3-D motion capture. Standard MRI sequences were used for articular and meniscal cartilage T1rho and T2 relaxation times and for quadriceps and hamstrings muscle ACSA. Frontal plane kinetics during the stance phase of walking was calculated. Generalized estimating equation models were used to identify muscle variables that predicted MRI and gait parameters.

Results Quadriceps-hamstrings and medial-lateral quadriceps ACSA ratios were positively related to frontal plane loading (β = .21–.54, $P \leq .006$), global articular cartilage relaxation times (β = .22–.28, $P \leq .041$), and the medial-lateral ratio of meniscus T1rho relaxation time (β = .26–.36, $P \leq .049$). The medial-lateral quadriceps ACSA ratio was positively related to global meniscus T1rho relaxation times (β = .30, P = .046).

Conclusion Higher quadriceps-hamstrings and medial-lateral quadriceps ACSA ratios were associated with higher frontal plane loading during walking and with articular and meniscal cartilage T1rho and T2 relaxation times. These findings highlight the relationships between different knee tissues and knee mechanics in young, healthy individuals. *J Orthop Sports Phys Ther 2013;43(12):881–890. Epub 30 October 2013. doi:10.2519/jospt.2013.4486*

Knee/ACL

Prevention

Knee Surg Sports Traumatol Arthrosc. 2013 Oct 26.

Prevention of non-contact anterior cruciate ligament injuries in sports. Part II: systematic review of the effectiveness of prevention programmes in male athletes.

Alentorn-Geli E, Mendiguchía J, Samuelsson K, Musahl V, Karlsson J, Cugat R, Myer GD.
Author information

Abstract

PURPOSE:
To synthesize the results of systematic literature review focused on the effectiveness of anterior cruciate ligament (ACL) injury prevention programmes in male athletes.

METHODS:
All abstracts and articles of potential interest identified through the systematic literature search were reviewed in detail to determine on inclusion status. Information regarding prevention programmes to reduce ACL injuries or to modify risk factors for ACL injuries in male athletes was systematically extracted and included intervention and study design, characteristics of participants, sport and level of competition, characteristics of prevention programmes, results, and conclusions. All studies were evaluated for methodological quality to assess the risk of bias.

RESULTS:
The principal findings of this systematic review are as follows: (1) most of the studies applied prevention programmes that utilized risk factors as outcomes of interest as opposed to ACL injury incidence (5 and 2 studies, respectively); (2) the effectiveness of prevention programmes to reduce ACL injuries in male athletes is equivocal (1 in favour, 1 against) and only refers to soccer players; (3) the effectiveness of prevention programmes to modify risk factors for ACL injuries in male athletes is controversial (2 in favour, 3 against) and outcome data are limited to cutting manoeuvres.

CONCLUSION:
Data regarding the effectiveness of prevention programmes to reduce ACL injuries or to modify risk factors for ACL injuries in male athletes are scarce and not conclusive. Future research to better determine the most effective approaches to optimize the effectiveness of prevention programmes targeted to reduce ACL injuries in male athletes is warranted.

LEVEL OF EVIDENCE: Systematic review on level I-II evidence studies, Level II. PMID: 24162718

NM training to reduce ACL injury

Sports Med. 2013 Dec 27.

Dosage Effects of Neuromuscular Training Intervention to Reduce Anterior Cruciate Ligament Injuries in Female Athletes: Meta- and Sub-Group Analyses.

Sugimoto D, Myer GD, Barber Foss KD, Hewett TE.
Author information

Abstract

BACKGROUND:
Although a series of meta-analyses demonstrated neuromuscular training (NMT) is an effective intervention to reduce anterior cruciate ligament (ACL) injury in female athletes, the potential existence of a dosage effect remains unknown.

OBJECTIVE:
Our objective was to systematically review previously published clinical trials and evaluate potential dosage effects of NMT for ACL injury reduction in female athletes.

DESIGN:
This study took the form of a meta- and sub-group analysis.

SETTING:
The keywords 'knee', 'anterior cruciate ligament', 'ACL', 'prospective', 'neuromuscular', 'training', 'female', and 'prevention' were utilized in PubMed and EBSCO host for studies published between 1995 and May 2012.

PARTICIPANTS:
Inclusion criteria set for studies in the current analysis were (i) recruited female athletes as subjects, (ii) documented the number of ACL injuries, (iii) employed an NMT intervention aimed to reduce ACL injuries, (iv) had a control group, (v) used a prospective control trial design, and (vi) provided NMT session duration and frequency information.

MAIN OUTCOME MEASURES:
The number of ACL injuries and female athletes in each group (control and intervention) were compared based on duration, frequency, and volume of NMT via odds ratios (ORs).

RESULTS:
A total of 14 studies were reviewed. Analyses that compared the number of ACL injuries with short versus long NMT duration showed greater ACL injury reduction in female athletes who were in the long NMT duration group (OR 0.35, 95 % CI 0.23-0.53, p = 0.001) than in those in the short NMT duration group (OR 0.61, 95 % CI 0.41-0.90, p = 0.013). Analyses that compared single versus multi NMT frequency indicated greater ACL injury reduction in multi NMT frequency (OR 0.35, 95 % CI 0.23-0.53, p = 0.001) compared with single NMT frequency (OR 0.62, 95 % CI 0.41-0.94, p = 0.024). Combining the duration and frequency of NMT programs, an inverse dose-response association emerged among low (OR 0.66, 95 % CI 0.43-0.99, p = 0.045), moderate (OR 0.46, 95 % CI 0.21-1.03, p = 0.059), and high (OR 0.32, 95 % CI 0.19-0.52, p = 0.001) NMT volume categories.

CONCLUSIONS:
The inverse dose-response association observed in the subgroup analysis suggests that the higher the NMT volume, the greater the prophylactic effectiveness of the NMT program and increased benefit in ACL injury reduction among female athletes.

PMID: 24370992

Pivoting training

Med Sci Sports Exerc. 2014 Jan 1.

Effects of Pivoting Neuromuscular Training on Pivoting Control and Proprioception.

Lee SJ, Ren Y, Chang AH, Geiger F, Zhang LQ.
Author information

Abstract

PURPOSE:
Pivoting neuromuscular control and proprioceptive acuity may play an important role in ACL injuries. The goal of this study was to investigate whether pivoting neuromuscular training on an offaxis elliptical trainer (POINT) could improve pivoting neuromuscular control, proprioceptive acuity, and functional performance.

METHODS:
Among 41 subjects, 21 subjects participated in 18 sessions of POINT (3 sessions/week for 6 weeks), and 20 subjects served as controls who did their regular workout. Both groups received pre-, mid-, and post-intervention evaluations. Propensity score analysis with multivariable regression adjustment was used to investigate the effect of training on pivoting neuromuscular control (pivoting instability, leg pivoting stiffness, maximum internal and external pivoting angles), proprioceptive acuity, and functional performance in both groups.

RESULTS:
Compared to the control group, the training group significantly improved pivoting neuromuscular control as reduced pivoting instability, reduced maximum internal and external pivoting angles, increased leg pivoting stiffness, and decreased entropy of time to peak EMG in the gluteus maximus and lateral gastrocnemius under pivoting perturbations. Furthermore, the training group enhanced weight-bearing proprioceptive acuity and improved the single leg hop distance.

CONCLUSION:
Improvement of pivoting neuromuscular control in functional weight-bearing activities and task performances following POINT may help develop lower limb injury prevention and rehabilitation methods to reduce ACL and other musculoskeletal injuries associated with pivoting sports.

PMID: 24389517

Sex and genetic factors

Sex comparison of familial predisposition to anterior cruciate ligament injury

Knee Surgery, Sports Traumatology, Arthroscopy, 01/09/2014 **Review Article**

Myer GD, et al.

Abstract

Purpose

In an effort to identify risk factors for anterior cruciate ligament (ACL) injury, many potential risk factors have been proposed, including familial predisposition. However, no study has evaluated familial predisposition in male or females separately. The purpose of this study was to determine whether a familial predisposition to ACL injury exists in both males and females.

Methods

One hundred and twenty (78 males and 42 females) patients who had undergone surgical ACL reconstruction were recruited as the ACL group, and 107 patients (67 males and 40 females) that had undergone arthroscopic partial menisectomy, with no previous history of ACL injury, were recruited as the referent control group. A familial ACL injury and subject particulars questionnaire was completed.

Results

When all subjects were combined, the ACL group (20.0 %, 24 of 120) did not demonstrate a higher familial (first-degree relative) prevalence (n.s.) of ACL injury compared to the referent control group (15.0 %; 16 of 107 patients). When the data were stratified by sex, the male ACL group (19.2 %, 15 of 78) demonstrated a significantly higher familial (first-degree relative) prevalence ($P = 0.02$) of ACL injury compared to the male referent control group (7.5 %; 5 of 67 patients). There were no differences among the females (n.s.).

Discussion

The results of this study show that male patients with ACL tears are more likely to have a first-degree relative with an ACL tear compared to male referent control subjects. Future research is warranted to better delineate sex-specific risk factors for ACL injuries could help guide intervention programs aimed at preventative treatment strategies, especially in high-risk families.

Level of evidence III.

Motor control training

Arthroscopy. 2013 Dec 30. pii: S0749-8063(13)01161-4. doi: 10.1016/j.arthro.2013.10.009.

Neuromuscular Retraining Intervention Programs: Do They Reduce Noncontact Anterior Cruciate Ligament Injury Rates in Adolescent Female Athletes?

Noyes FR1, Barber-Westin SD2.
Author information

Abstract

PURPOSE:
The purpose of this study was to identify neuromuscular training intervention programs that significantly reduced the incidence of noncontact anterior cruciate ligament (ACL) injury rates in female adolescent athletes.

METHODS:
A systematic search of PubMed was conducted to determine the outcome of ACL neuromuscular retraining programs in a specific population. The inclusion criteria were English language, published from 1994-2013, original clinical trials, all evidence levels, female athletes aged 19 years or younger, and noncontact ACL injury incidence rates determined by athlete-exposures.

RESULTS:
Of 694 articles identified, 8 met the inclusion criteria. Three training programs significantly reduced noncontact ACL injury incidence rates in female adolescent athletes. These were the Sportsmetrics, Prevent Injury and Enhance Performance, and Knee Injury Prevention programs. The estimated number of athletes who needed to train to prevent 1 ACL injury in these 3 studies ranged from 70 to 98, and the relative risk reduction ranged from 75% to 100%. Five programs did not significantly reduce noncontact ACL injury incidence rates. The ACL injury incidence rates for control subjects were lower in these studies (0.03 to 0.08 per 1,000 athlete-exposures) than in those investigations that had a significant effect (0.21 to 0.49 per 1,000 athlete-exposures). There was wide variability among all programs in the frequency, duration, and timing of training; how training was conducted, supervised, or controlled; the components of the program; how exposure data were calculated; noncontact ACL injury incidence rates in the control groups; and compliance with training.

CONCLUSIONS:
Three ACL intervention programs successfully reduced noncontact ACL injury incidence rates in female adolescent athletes. Pooling of data of all ACL intervention programs is not recommended because of numerous methodologic differences among studies.

LEVEL OF EVIDENCE:
Level II, systematic review of Level I and II studies.

 PMID: 24388450

Meniscus

Exercise post meniscectomy

Knee Surg Sports Traumatol Arthrosc. 2012 Dec 23.

Is postoperative exercise therapy necessary in patients with degenerative meniscus? A randomized controlled trial with one year follow-up.

Osterås H, Osterås B, Torstensen TA.
Author information

Abstract

PURPOSE:
There is no consensus on a postoperative rehabilitation regimen for patients who have undergone surgery for medial meniscus damage. The aim of this investigation was to evaluate two rehabilitation approaches after arthroscopic surgery in patients with degenerative meniscus: supervised medical exercise therapy versus no treatment.

METHODS:
A prospective randomized controlled clinical trial. Over 4 months, 70 participants were randomly assigned into either a medical exercise therapy group (n = 36) or a control group (n = 34). Pain was a composite score of a visual analogue scale (VAS), and function was measured with a functional assessment questionnaire (KOOS), while anxiety and depression were measured with the Hospital Anxiety and Depression Scale. Function was also measured with tests of quadriceps femoris strength and a one-leg jump test.

RESULTS:
Prognostic variables were similar between the groups at baseline, with five (7 %) patients dropping out during the treatment period and another six (8 %) before the one-year follow-up. After 3 months, the medical exercise therapy group achieved significantly better outcome effects than the control group for pain and function. The results after the 12-month follow-up indicated the same results as at posttest, whereas Hospital Anxiety and Depression Scale, fiveRM and the one-leg hop test also demonstrated a significant difference between the groups from pre- to posttest to follow-up.

CONCLUSION:
In patients with surgery for degenerative meniscus damage, postoperative medical exercise therapy is an efficient treatment alternative compared to no treatment.

LEVEL OF EVIDENCE: I. PMID: 23263261

Ultrasound dx of meniscus

J Knee Surg DOI: 10.1055/s-0034-1367731 **Original Article**

Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.

MRI versus Ultrasonography to Assess Meniscal Abnormalities in Acute Knees

James L. Cook[1, 2], Cristi R. Cook[1], James P. Stannard[2], Gavin Vaughn[3], Nichole Wilson[2], Brandon L. Roller[4], Aaron M. Stoker[1], Prakash Jayabalan[5], Moses Hdeib[6], Keiichi Kuroki[1]

Abstract

While magnetic resonance imaging (MRI) is often considered the "gold standard" diagnostic imaging modality for detection of meniscal abnormalities, it is associated with misdiagnosis in as high as 47% of cases, is costly, and is not readily available to a large number of patients. Ultrasonographic examination of the knee has been reported to be an effective diagnostic tool for this purpose with the potential to overcome many of the shortcomings of MRI. The purpose of this study is to determine the clinical usefulness of ultrasonography for diagnosis of meniscal pathology in patients with acute knee pain and compare its diagnostic accuracy to MRI in a clinical setting. With Institutional Review Board approval, patients ($n = 71$) with acute knee pain were prospectively enrolled with informed consent. Preoperative MRI (1.5 T) was performed on each affected knee using the hospital's standard equipment and protocols and read by faculty radiologists trained in musculoskeletal MRI. Ultrasonographic assessments of each affected knee were performed by one of two faculty members trained in musculoskeletal ultrasonography using a 10 to 14 MHz linear transducer. Arthroscopic evaluation of affected knees was performed by one of three faculty orthopedic surgeons to assess and record all joint pathology, which served as the reference standard for determining presence, type, and severity of meniscal pathology. All evaluators for each diagnostic modality were blinded to all other data. Data were collected and compared by a separate investigator to determine sensitivity (Sn), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV), correct classification rate (CCR), likelihood ratios (LR[+] and LR[−]), and odds ratios. Preoperative ultrasonographic assessment of meniscal pathology was associated with Sn = 91.2%, Sp = 84.2%, PPV = 94.5%, NPV = 76.2%, CCR = 89.5%, LR(+) = 5.78, and LR(−) = 0.10. Preoperative MRI assessment of meniscal pathology was associated with Sn = 91.7%, Sp = 66.7%, PPV = 84.6%, NPV = 80.0%, CCR = 81.1%, LR(+) = 2.75, and LR(−) = 0.13. Ultrasonography was two times more likely than MRI to correctly determine presence or absence of meniscal pathology seen arthroscopically in this study.

Ultrasonography is a useful tool for diagnosis of meniscal pathology with potential advantages over MRI. Based on these data and available portable equipment, ultrasonography could be considered for use as a point-of-injury diagnostic modality for meniscal injuries.

Keywords ultrasonography - magnetic resonance imaging - meniscus - knee - arthroscopy

Mesenchymal cells

Adult human mesenchymal stem cells delivered via intra-articular injection to the knee following partial medial meniscectomy a randomized, double-blind, controlled study □

The Journal of Bone & Joint Surgery, 01/16/2014 **Evidence Based Medicine**
Vangsness CT, et al.

Background:
There are limited treatment options for tissue restoration and the prevention of degenerative changes in the knee. Stem cells have been a focus of intense preclinical research into tissue regeneration but limited clinical investigation. In a randomized, double-blind, controlled study, the safety of the intra-articular injection of human mesenchymal stem cells into the knee, the ability of mesenchymal stem cells to promote meniscus regeneration following partial meniscectomy, and the effects of mesenchymal stem cells on osteoarthritic changes in the knee were investigated.
Methods:
A total of fifty-five patients at seven institutions underwent a partial medial meniscectomy. A single superolateral knee injection was given within seven to ten days after the meniscectomy. Patients were randomized to one of three treatment groups: Group A, in which patients received an injection of 50 × 106 allogeneic mesenchymal stem cells; Group B, 150 × 106 allogeneic mesenchymal stem cells; and the control group, a sodium hyaluronate (hyaluronic acid/hyaluronan) vehicle control. Patients were followed to evaluate safety, meniscus regeneration, the overall condition of the knee joint, and clinical outcomes at intervals through two years. Evaluations included sequential magnetic resonance imaging (MRI).
Results:
No ectopic tissue formation or clinically important safety issues were identified. There was significantly increased meniscal volume (defined a priori as a 15% threshold) determined by quantitative MRI in 24% of patients in Group A and 6% in Group B at twelve months post meniscectomy ($p = 0.022$). No patients in the control group met the 15% threshold for increased meniscal volume. Patients with osteoarthritic changes who received mesenchymal stem cells experienced a significant reduction in pain compared with those who received the control, on the basis of visual analog scale assessments.
Conclusions:
There was evidence of meniscus regeneration and improvement in knee pain following treatment with allogeneic human mesenchymal stem cells. These results support the study of human mesenchymal stem cells for the apparent knee-tissue regeneration and protective effects.
Level of Evidence:
Therapeutic Level I. See Instructions for Authors for a complete description of levels of evidence.
Peer Review
This article was reviewed by the Editor-in-Chief and one Deputy Editor, and it underwent blinded review by two or more outside experts. It was also reviewed by an expert in methodology and statistics. The Deputy Editor reviewed each revision of the article, and it underwent a final review by the Editor-in-Chief prior to publication. Final corrections and clarifications occurred during one or more exchanges between the author(s) and copyeditors

Plasma impact

Clin J Sport Med. 2014 Jan;24(1):31-43. doi: 10.1097/01.jsm.0000432855.85143.e5.

Platelet-rich plasma in the management of articular cartilage pathology: a systematic review.

Dold AP, Zywiel MG, Taylor DW, Dwyer T, Theodoropoulos J.
Author information

Abstract

OBJECTIVE:
Using systematic review methodology, we endeavored to answer the following questions concerning the treatment of osteochondral pathology: (1) what pathologies have been treated in vivo with the use of platelet-rich plasma (PRP); (2) what methods of PRP preparation and delivery have been reported; (3) what assessment tools and comparison group have been used to assess its effectiveness; and (4) what are the clinical outcomes of its use.

DATA SOURCES:
A systematic literature search was performed of the OVID, EMBASE, and Evidence Based Medicine Reviews databases to identify all studies published up to October 2012 that assessed clinical outcomes of the use of PRP for the treatment of chondral and osteochondral pathology, excluding those including concomitant management of acute fractures or ligament reconstruction.

DATA EXTRACTION:
The included studies were reviewed and the following data were extracted and tabulated: study authors' year and journal, study design and level of evidence, pathology treated, methods of PRP preparation and delivery, and clinical outcome scores.

DATA SYNTHESIS:
Ten studies were included in the final analysis. The majority of studies assessed the use of PRP in the treatment of degenerative osteoarthritis of the knee or hip (representing 570 of a total of 662 joints). The majority of patients were treated with intra-articular injections, whereas 2 studies used PRP as an adjunct to surgical treatment. Significant improvements in joint-specific clinical scores (7 of 8 studies), general health scores (4 of 4 studies), and pain scores (4 of 6 studies) compared with baseline were reported up to 6-month follow-up, but few studies provided longer-term data. No studies reported worse scores compared with baseline at final follow-up. Three of 4 comparative studies reported significantly better clinical and/or pain scores when compared with hyaluronic acid injections at similar follow-up times.

CONCLUSIONS:
Currently, there is a paucity of data supporting the use of PRP for the management of focal traumatic osteochondral defects. There is limited evidence suggesting short-term clinical benefits with the use of PRP for symptomatic osteoarthritis of the knee, but the studies published to date are of poor quality and at high risk for bias. Further high-quality comparative studies with longer follow-up are needed to ascertain whether PRP is beneficial, either alone or as an adjunct to surgical procedures, in the management of articular cartilage pathology.

PMID: 24231930

Scaffolding/replacement

Knee Surg Sports Traumatol Arthrosc. 2012 Dec 6.

Biodegradable polyurethane meniscal scaffold for isolated partial lesions or as combined procedure for knees with multiple comorbidities: clinical results at 2 years.

Kon E, Filardo G, Zaffagnini S, Di Martino A, Di Matteo B, Marcheggiani Muccioli GM, Busacca M, Marcacci M.
Author information

Abstract

PURPOSE:
The aim of this study is to evaluate the safety and clinical efficacy of this novel polyurethane meniscal scaffold to treat partial meniscal loss.

METHODS:
Eighteen patients (11 men and 7 women, mean age: 45 years) affected by irreparable acute meniscal tears requiring partial meniscectomy or chronic prior loss of meniscal tissue were enrolled in the study. They underwent arthroscopic polyurethane meniscal scaffold implantation (13 medial and 5 lateral) and, in case of presence of other comorbidities, concurrent procedures were also performed. Patients were prospectively evaluated up to 2 years of follow-up through IKDC objective, IKDC subjective, and Tegner scores. Furthermore, MRI evaluation of the meniscal scaffold was performed.

RESULTS:
No major adverse events were observed. A statistically significant increase in all the clinical parameters considered was found. The IKDC objective score increased from 61 % of normal or nearly normal knees at basal evaluation to 94 % at 2 years of follow-up ($p = 0.01$). There was also a significant increase in the IKDC subjective score both at 6-12 months of follow-up ($p = 0.03$ and $p < 0.005$), which was confirmed at 24 months. The Tegner score also showed a significant increase from the pre-operative level (median value 2, range 1-5) to final evaluation (median value 3, range 2-5; $p = 0.005$), albeit not reaching the pre-injury sports activity level.

CONCLUSIONS:
The implantation of this novel polyurethane scaffold proved to be a safe and potentially effective procedure to treat partial meniscal loss with encouraging results at short-term follow-up. Further high-quality studies with larger numbers of patients and longer evaluation times are needed to confirm these preliminary data.

LEVEL OF EVIDENCE: Case series, Level IV. PMID: 23223879

Patella

Varus contribution

Knee. 2013 Nov 27. pii: S0968-0160(13)00238-X. doi: 10.1016/j.knee.2013.11.011.

Knee valgus angle during single leg squat and landing in patellofemoral pain patients and controls.

Herrington L.
Author information

Abstract

BACKGROUND:
Patellofemoral pain (PFP) is a commonly presenting disorder of the lower limb, frequently effecting young physically active individuals particularly females. The condition has been associated with poor control of limb alignment while undertaking unilateral limb loading tasks. This poor alignment of the limb is believed to alter loading stress within the patellofemoral joint. This study aims to investigate the degree of knee valgus, assessed as 2D frontal plane projection angle (FPPA) during single leg squatting (SLS) and hop landing (SLL) tasks in patients with PFP and compare their performance to controls and the uninjured limb.

METHOD:
Twelve female subjects with unilateral PFP formed the patient group and thirty asymptomatic females formed the control group. They had their 2D frontal plane projection angle (FPPA) assessed during single leg squatting (SLS) and hop landing (SLL) tasks.

RESULTS:
In the asymptomatic control group the mean FPPA for SLS was 8.4±5.1° and SLL had a mean FPPA of 13.5±5.7°. In the PFP group the mean FPPA for SLS was 16.8±5.4° and SLL had a mean FPPA of 21.7+/-3.6°, these differences were significant ($p<0.01$) for both tasks.

CONCLUSION:
Patients with PFP have a greater degree of knee valgus on unilateral limb loading task than either their contralateral asymptomatic limb or an asymptomatic control group. If not corrected this may lead to further PFJ stress and ongoing morbidity.

KEYWORDS: Alignment, Limb load, Pain PMID: 24380805

Strengthening hip

Arch Phys Med Rehabil. 2014 Jan 15. pii: S0003-9993(14)00007-0. doi: 10.1016/j.apmr.2013.12.022.

Posterolateral Hip Muscle Strengthening verses Quadriceps Strengthening for Patellofemoral Pain: A Comparative Control Trial.

Khayambashi K1, Fallah A1, Movahedi A1, Bagwell J2, Powers C3.
Author information

Abstract

STUDY DESIGN:
Comparative control trial OBJECTIVE: To compare the efficacy of posterolateral hip muscle strengthening versus quadriceps strengthening in reducing pain and improving health status in persons with patellofemoral pain (PFP).

DESIGN:
Comparative control trial.

SETTING:
Private rehabilitation facility PARTICIPANTS: Thirty-six persons with a diagnosis of PFP (18 males and 18 females).

INTERVENTIONS:
Male and female patients were alternately assigned to a posterolateral hip muscle strengthening group (9 males and 9 females) or a quadriceps strengthening group (9 males and 9 females). The posterolateral hip muscle strengthening group performed hip abductor and external rotator strengthening exercises while the quadriceps strengthening group performed quadriceps strengthening exercises (3 times a week for 8 weeks).

MAIN OUTCOME MEASURES:
Pain (VAS) and health status (WOMAC) were assessed at baseline, post-intervention, and at a 6 month follow-up.

RESULTS:
Significant improvements in VAS and WOMAC scores were observed in both groups from baseline to post-intervention and from baseline to 6 month follow-up ($p<.001$). Improvements in VAS and WOMAC scores in the posterolateral hip exercise group were superior to those in the quadriceps exercise group post-intervention and at the 6 month follow up ($p<.05$).

CONCLUSION:
Although both intervention programs resulted in decreased pain and improved function in persons with PFP, outcomes in the posterolateral hip exercise group were superior to the quadriceps exercise group. The superior outcomes obtained in the posterolateral hip exercise group were maintained 6 months post-intervention.

KEYWORDS: anterior knee pain, clinical trial, patella, rehabilitation PMID: 24440362

Jump height/patella

Scand J Med Sci Sports. 2014 Jan 15. doi: 10.1111/sms.12172.

Variations in jump height explain the between-sex difference in patellar tendon loading during landing.

Janssen I, Brown NA, Munro BJ, Steele JR.
Author information

Abstract
Patellar tendinopathy is the most common overuse knee injury in volleyball, with men reporting more than twice the injury prevalence than women. Although high patellar tendon loading is thought to be a causative factor of patellar tendinopathy, it is unknown whether between-sex variations in landing technique account for differences in patellar tendon loading. It was hypothesized that male volleyball players would display differences in landing technique and would generate higher patellar tendon loading than their female counterparts. The landing technique and patellar tendon loading of 20 male and 20 female volleyball players performing a lateral stop-jump block movement were collected. Independent t-tests were used to identify any between-sex differences in landing technique with the data grouped to account for differences in jump height and in anthropometry. Male volleyball players were taller and heavier, landed from a higher height, displayed differences in landing kinematics, generated a significantly greater knee extensor moment, and experienced higher patellar tendon loading than female players when all 40 participants were compared. However, when participants were matched on jump height, they generated similar patellar tendon loading, irrespective of their sex. These results imply that jump height is a more important determinant of patellar tendon loading than sex.

KEYWORDS:
Patellar tendinopathy, biomechanics, knee, volleyball

PMID: 24422682

Mesenchymal injections

Stem Cells. 2014 Jan 21. doi: 10.1002/stem.1634.

Intra-articular injection of mesenchymal stem cells for the treatment of osteoarthritis of the knee: A proof-of-concept clinical trial.

Jo CH, Lee YG, Shin WH, Kim H, Chai JW, Jeong EC, Kim JE, Shim H, Shin JS, Shin IS, Ra JC, Oh S, Yoon KS.

Abstract

Mesenchymal stem cells are known to have a potential for articular cartilage regeneration. However, most studies focused on focal cartilage defect through surgical implantation. For the treatment of generalized cartilage loss in osteoarthritis, an alternative delivery strategy would be more appropriate. The purpose of this study was to assess the safety and efficacy of intra-articular injection of autologous adipose tissue derived MSCs (AD-MSCs) for knee osteoarthritis. We enrolled 18 patients with osteoarthritis of the knee and injected AD MSCs into the knee. The phase I study consists of 3 dose-escalation cohorts; the low-dose (1.0x107 cells), mid-dose (5.0x107) and high-dose (1.0x108) group with 3 patients each. The phase II included 9 patients receiving the high-dose. The primary outcomes were the safety and the Western Ontario and McMaster Universities Osteoarthritis index (WOMAC) at 6 months. Secondary outcomes included clinical, radiological, arthroscopic, and histological evaluations. There was no treatment-related adverse event. The WOMAC score improved at 6 months after injection in the high-dose group. The size of cartilage defect decreased while the volume of cartilage increased in the medial femoral and tibial condyles of the high-dose group. Arthroscopy showed that the size of cartilage defect decreased in the medial femoral and medial tibial condyles of the high-dose group. Histology demonstrated thick, hyaline-like cartilage regeneration.

These results showed that intra-articular injection of 1.0x108 AD MSCs into the osteoarthritic knee improved function and pain of the knee joint without causing adverse events, and reduced cartilage defects by regeneration of hyaline-like articular cartilage. Stem Cells 2014.

KEYWORDS: Osteoarthritis, adipose-tissue derived mesenchymal stem cells, cartilage regeneration, intra-articular injection PMID: 24449146

Running Gait retraining/PF pain

J Orthop Sports Phys Ther 2013;43(12):864–874

Varied Response to Mirror Gait Retraining of Gluteus Medius Control, Hip Kinematics, Pain, and Function in 2 Female Runners With Patellofemoral Pain

Authors: Richard W. Willy, Irene S. Davis

Background The underlying mechanism of the changes in running mechanics after gait retraining is presently unknown. This case report assesses changes in muscle coordination and kinematics during treadmill running and step ascent in 2 female runners with patellofemoral pain after mirror gait retraining.

Case Description Two female runners with chronic patellofemoral pain underwent 8 sessions of mirror gait retraining during treadmill running. Subjective measures and hip abductor strength were recorded at baseline and after the retraining phase. Changes in hip mechanics and electromyography data of the gluteus medius during treadmill running and step ascent were also assessed.

Outcomes Both runners reported improvements in pain and function that were maintained for at least 3 months. During running, peak contralateral pelvic drop (baseline-postretraining difference: runner 1, 2.6° less; runner 2, 1.7° less) and peak hip adduction (baseline-postretraining difference: runner 1, 5.2° less; runner 2, 6.3° less) were reduced after retraining. Kinematic reductions accompanied earlier activation of the gluteus medius relative to foot strike (baseline-postretraining difference: runner 1, 12.6 milliseconds earlier; runner 2, 37.3 milliseconds earlier) and longer duration of gluteus medius activity (runner 1, 55.8 milliseconds longer; runner 2, 44.4 milliseconds longer). Runner 1 transferred reduced contralateral pelvic drop to step ascent, whereas runner 2 did not (contralateral pelvic drop baseline-postretraining difference: runner 1, 3.6° less; runner 2, 1.5° more; hip adduction baseline-postretraining difference: runner 1, 3.0° less; runner 2, 0.5° more). Both runners demonstrated earlier onset of gluteus medius activity during step ascent (baseline-postretraining difference: runner 1, 48.0 milliseconds earlier; runner 2, 28.3 milliseconds earlier), but only runner 1 demonstrated longer activation duration (runner 1, 25.0 milliseconds longer; runner 2, 69.4 milliseconds shorter).

Discussion While changes in hip mechanics and gluteus medius activity during running were consistent with those noted during step ascent for runner 1, runner 2 failed to demonstrate similar consistency between the tasks. Earlier onset and longer duration of gluteus medius activity may have been necessary to alter step mechanics for runner 2.

Level of Evidence Therapy, level 4. *J Orthop Sports Phys Ther 2013;43(12):864–874. Epub 30 October 2013. doi:10.2519/jospt.2013.451*

Knee/total

Abstract

Background

Preoperative pain and functional status are strong determinants of postsurgical success in total knee arthroplasty. Patients suffering chronic pain from other coexistent musculoskeletal problems may respond differently postoperatively, with potentially poorer outcomes after surgery. The aim of the study was to determine the influence of low back pain on the outcome of total knee replacement surgery.

Methods

All patients completed Oxford Knee Scores (OKS), American Knee Society Scores (AKSS) and SF-12 (both physical and mental components). Patients were divided into those with (n=40) and without a documented history of low back pain (n=305).

Results

OKS, AKSS and SF-12 physical scores were significantly worse for patients with low back pain at 24months following surgery. The mental component of the SF-12 measure demonstrated a significant improvement in median mental health post-operatively for patients with no current history of low back pain. In contrast the group with low back pain showed no improvement in mental health scores post-operatively.

Conclusion

This study demonstrates that symptomatic low back pain influences functional outcome after total knee arthroplasty surgery and that patients with low back pain show limited or no improvement in mental health post-operatively.

Level of evidence II

OSTEOARTHRITIS/KNEE
Platelet rich plasma anti-inflammatory

Am J Sports Med. 2013 Nov 5

The Anti-inflammatory and Matrix Restorative Mechanisms of Platelet-Rich Plasma in Osteoarthritis.

Sundman EA, Cole BJ, Karas V, Della Valle C, Tetreault MW, Mohammed HO, Fortier LA.
Author information

Abstract

BACKGROUND:Intra-articular (IA) treatment with platelet-rich plasma (PRP) for osteoarthritis (OA) results in improved patient-reported pain and function scores.

PURPOSE:To measure the effects of PRP and high molecular weight hyaluronan (HA) on the expression of anabolic and catabolic genes and on the secretion of nociceptive and inflammatory mediators from OA cartilage and synoviocytes. STUDY DESIGN:Controlled laboratory study.

METHODS:Synovium and cartilage harvested from patients undergoing total knee arthroplasty were co-cultured with media of PRP or HA. Tumor necrosis factor-α (TNF-α), interleukin-6 (IL-6), and IL-1β were measured in the media by enzyme-linked immunosorbent assay. Hyaluronan synthase-2 (HAS-2), matrix metalloproteinase-1 (MMP-1), MMP-13, and TNF-α genes were measured in synoviocytes by reverse transcription polymerase chain reaction (RT-PCR). Collagen type I α1 (COL1A1), COL2A1, aggrecan (ACAN), and MMP-13 gene expression were measured in cartilage by quantitative RT-PCR.

RESULTS:Media TNF-α concentration was decreased in PRP and HA compared with control cultures (PRP = 6.94 pg/mL, HA = 6.39 pg/mL, control = 9.70 pg/mL; $P \leq .05$). Media IL-6 concentration was decreased in HA compared with PRP and control (HA = 5027 pg/mL, PRP = 5899 pg/mL, control = 5613 pg/mL; $P \leq .05$). Media IL-1β was below detectable concentrations (<0.1 pg/mL) in all samples. Synoviocyte MMP-13 expression was decreased in PRP compared with HA and control (PRP = 10.1, HA = 12.8, control = 13.5; $P \leq .05$). Synoviocyte HAS-2 expression was increased in PRP compared with HA and control (PRP = 12.1, HA = 9.8, control = 8.7; $P \leq .05$). Cartilage ACAN expression was increased in PRP compared with HA, but neither was different from control (PRP = 8.8, HA = 7.7, control = 7.6; $P \leq .05$); COL1A1 expression was increased in HA compared with PRP, but neither was different from control (PRP = 14.9, HA = 13.5, control = 12.9; $P \leq .05$). Neither platelet nor leukocyte concentration had a significant effect on outcome measurements (gene or protein expression data) in cartilage or synoviocytes ($P > .05$).

CONCLUSION: Both PRP and HA treatments of OA joint tissues result in decreased catabolism, but PRP treatment also resulted in a significant reduction of MMP-13, an increase in HAS-2 expression in synoviocytes, and an increase in cartilage synthetic activity compared with HA. These results indicate that PRP acts to stimulate endogenous HA production and decrease cartilage catabolism. Platelet-rich plasma showed similar effects as HA in the suppression of inflammatory mediator concentration and expression of their genes in synoviocytes and cartilage.

CLINICAL RELEVANCE: The antinociceptive and anti-inflammatory activities of PRP support its use in OA joints to reduce pain and modulate the disease process. This study supports further clinical investigations of IA PRP for the treatment of OA.

KEYWORDS: articular cartilage, biology of cartilage, growth factors/healing enhancement, knee, platelet-rich plasma, regenerative medicine, synovium PMID: 24192391

OA impacts driving ability

Research article

Osteoarthritis of the knee or hip significantly impairs driving ability (cross-sectional survey)

Ulf Krister Hofmann, **Maurice Jordan**, **Ina Rondak**, **Petra Wolf**, **Torsten Kluba** and **Ingmar Ipach**

BMC Musculoskeletal Disorders 2014, **15**:20 doi:10.1186/1471-2474-15-20

Published: 17 January 2014

Abstract (provisional)

Background

Advising patients about when they can drive after surgery is common practice after arthroplasty of the knee or hip. In the literature, the preoperative braking performance values of the patients are frequently taken as the "safe" landmark. We hypothesised that osteoarthritis (OA), the most frequent reason for arthroplasty, already compromises the ability to perform an emergency stop. We expected that both Reaction Time (RT) and Movement Time (MT) as components of the Total Brake Response Time (TBRT), would be prolonged in patients with OA of the knee or hip in comparison with healthy subjects. We also expected maximum pressure levels on the brake pedal to be reduced in such cases.

Methods

A real car cabin was equipped with pressure sensors on the accelerator and brake pedals to measure RT, MT, TBRT and maximum Brake Force (BF) under realistic spatial constraints. Patients with OA of the knee (right n = 18, left n = 15) or hip (right n = 20, left n = 19) were compared with a healthy control group (n = 21).

Results

All measured values for TBRT in the control group remained below 600 ms. OA of the right hip or knee significantly prolonged the braking performance (right hip: TBRT $p = 0.025$, right knee: TBRT $p < 0.001$), whereas OA of the left hip did not impair driving ability (TBRT $p = 0.228$). Intriguingly, OA of the left knee prolonged RT and MT to the same degree as OA on the contralateral side (RT $p = 0.001$, MT $p < 0.001$).

Conclusions

This study demonstrates that depending on the localisation of OA, driving capability can be impaired; OA can significantly increase the total braking distance. To ensure safe traffic participation the safety margin for TBRT should be strictly set, under our experimental conditions, at around 600 ms. Moreover, therapeutic approaches to OA, such as physiotherapy, and patients receiving surgery of the left knee should take into account that left knee OA can also impair driving ability.

Activity related pain

Pain. 2013 Dec 27. pii: S0304-3959(13)00691-X. doi: 10.1016/j.pain.2013.12.028.

Increased Sensitivity to Physical Activity Among Individuals with Knee Osteoarthritis: Relation to Pain Outcomes, Psychological Factors and Responses to Quantitative Sensory Testing.

Wideman TH1, Finan PH2, Edwards RR3, Quartana PJ4, Buenaver LF2, Haythornthwaite JA2, Smith MT2.

Author information

Abstract

Recent findings suggest that certain individuals with musculoskeletal pain conditions have increased Sensitivity to Physical Activity (SPA) and respond to activities of stable intensity with increasingly severe pain.

This study aimed to determine the degree to which individuals with knee OA show heightened SPA in response to a standardized walking task and whether SAP cross-sectionally predicts psychological factors, responses to Quantitative Sensory Testing (QST) and different OA-related outcomes. 107 adults with chronic knee osteoarthritis completed self-report measures of pain, function and psychological factors, underwent QST and performed a 6-minute walk test. Participants rated their discomfort levels throughout the walking task; an index of SPA was created by subtracting first ratings from peak ratings. Repeated measures analysis of variance revealed that levels of discomfort significantly increased throughout the walking task.

A series of hierarchical regression analyses determined that after controlling for significant covariates, psychological factors and measures of mechanical pain sensitivity, individual variance in SPA predicted self-report pain and function and performance on the walking task. Analyses also revealed that both pain catastrophizing and the temporal summation of mechanical pain were significant predictors of SPA and that SPA mediated the relationship between catastrophizing and self-reported pain and physical function. The discussion addresses the potential processes contributing to SPA and the role it may play in predicting responses to different interventions for musculoskeletal pain conditions.

KEYWORDS: Activity-related pain, Chronic pain, Depression, Knee osteoarthritis, Mechanical pain, Musculoskeletal pain, Pain catastrophizing, Pain threshold, Pain-related function, Physical activity, Psychological factors, Quantitative sensory testing, Sensitivity to physical activity, Temporal summation of pain PMID: 24378879

Gait changes with biomechanical devise

J Orthop Surg Res. 2014 Jan 2;9(1):1.

Patients with knee osteoarthritis demonstrate improved gait pattern and reduced pain following a non-invasive biomechanical therapy: a prospective multi-centre study on Singaporean population.

Elbaz A, Mor A, Segal G, Aloni Y, Teo YH, Teo YS, Das-De S, Yeo SJ.

Abstract

BACKGROUND:
Previous studies have shown the effect of a unique therapy with a non-invasive biomechanical foot-worn device (AposTherapy) on Caucasian western population suffering from knee osteoarthritis. The purpose of the current study was to evaluate the effect of this therapy on the level of symptoms and gait patterns in a multi-ethnic Singaporean population suffering from knee osteoarthritis.

METHODS:
Fifty-eight patients with bilateral medial compartment knee osteoarthritis participated in the study. All patients underwent a computerized gait test and completed two self-assessment questionnaires (WOMAC and SF-36). The biomechanical device was calibrated to each patient, and therapy commenced. Changes in gait patterns and self-assessment questionnaires were reassessed after 3 and 6 months of therapy.

RESULTS:
A significant improvement was seen in all of the gait parameters following 6 months of therapy. Specifically, gait velocity increased by 15.9%, step length increased by 10.3%, stance phase decreased by 5.9% and single limb support phase increased by 2.7%. In addition, pain, stiffness and functional limitation significantly decreased by 68.3%, 66.7% and 75.6%, respectively. SF-36 physical score and mental score also increased significantly following 6 months of therapy (46.1% and 22.4%, respectively) ($P < 0.05$ for all parameters).

CONCLUSIONS:
Singaporean population with medial compartment knee osteoarthritis demonstrated improved gait patterns, reported alleviation in symptoms and improved function and quality of life following 6 months of therapy with a unique biomechanical device.Trial registration: Registration number NCT01562652.

PMID: 24383821

Manual Therapy and exercise/OA

JMMT **Volume 21 Issue 4 (November, 2013), pp. 220-228**

Manual physical therapy and perturbation exercises in knee osteoarthritis

Daniel Rhon[1], Gail Deyle[2], Norman Gill[2], Daniel Rendeiro[3]
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Fort Hood, TX, USA

Objectives: Knee osteoarthritis (OA) causes disability among the elderly and is often associated with impaired balance and proprioception. Perturbation exercises may help improve these impairments. Although manual physical therapy is generally a well-tolerated treatment for knee OA, perturbation exercises have not been evaluated when used with a manual physical therapy approach. The purpose of this study was to observe tolerance to perturbation exercises and the effect of a manual physical therapy approach with perturbation exercises on patients with knee OA.

Methods: This was a prospective observational cohort study of 15 patients with knee OA. The Western Ontario and McMaster Universities Arthritis Index (WOMAC), global rating of change (GROC), and 72-hour post-treatment tolerance were primary outcome measures. Patients received perturbation balance exercises along with a manual physical therapy approach, twice weekly for 4 weeks. Follow-up evaluation was done at 1, 3, and 6 months after beginning the program.

Results: Mean total WOMAC score significantly improved (P50.001) after the 4-week program (total WOMAC: initial, 105; 4 weeks, 56; 3 months, 54; 6 months, 57). Mean improvements were similar to previously published trials of manual physical therapy without perturbation exercises. The GROC score showed a minimal clinically important difference (MCID)$z3 in 13 patients (87%) at 4 weeks, 12 patients (80%) at 3 months, and 9 patients (60%) at 6 months. No patients reported exacerbation of symptoms within 72 hours following each treatment session.

Discussion: A manual physical therapy approach that also included perturbation exercises was well tolerated and resulted in improved outcome scores in patients with knee OA.
Keywords: Knee osteoarthritis, Manual therapy, Perturbation exercises, Physical therapy

FOOT AND ANKLE

Factors of flat feet

Demographic, physical, and radiographic factors associated with functional flatfoot deformity □

The Journal of Foot & Ankle Surgery, 01/14/2014 **Review Article**
Shibuya N, et al.

Abstract

In 1 of our previous studies, the occurrence of self-reported flatfoot was associated with self-reported increased age, male gender, Asian and African American races, veteran status, poor health, increased body mass index, callus, bunion, hammertoe, and arthritis. However, we had to rely on survey data to identify these risk factors, and the accuracy of the survey results was unknown. Therefore, we decided to identify the risk factors associated with flatfeet using objectively and more accurately measured data. A total of 94 patients were enrolled in the present study. The demographic data and physical and radiographic examination results were recorded by the investigators in the clinic. The data were then analyzed to identify the factors unique to flatfoot, measured and defined using a plantar pressure measurement system during natural gait. We learned that a painful tibialis posterior tendon was associated with flatfoot. The calcaneal inclination angle was also decreased in the flatfoot group. The talar declination, intermetatarsal, hallux abductus, and calcaneal cuboid angles, and static calcaneal stance eversion were elevated in the flatfoot group compared with the non-flatfoot group. Systematic evaluation of these associated factors will help in the understanding of the functional status of the flatfoot deformity.

Level of Clinical Evidence: 3

Keywords: foot, gait, pes planus, pronation, surgery

Ankle brace impact on gait

Lower extremity electromyography measures during walking with ankle destabilization devices

Journal of Sport Rehabilitation, 01/22/2014 **Review Article**
Donovan L, et a
Context: Ankle destabilization devices are rehabilitation tools that may improve neuromuscular control by increasing lower extremity muscle activation. Their effects should be tested in healthy individuals before being implemented in rehabilitation programs. **Objective:** To compare EMG activation of lower extremity muscles during walking while wearing 2 different ankle destabilization devices.

Design: Crossover. **Setting:** Laboratory. **Patients or Other Participants:** Fifteen healthy young adults (5 males, 10 females) participated.

Intervention(s): Surface EMG activity was recorded from the anterior tibialis, peroneus longus, lateral gastrocnemius, rectus femoris, biceps femoris and gluteus medius as subjects walked on a treadmill shod, with an ankle destabilization boot (ADB), and an ankle destabilization sandal (ADS).

Main Outcome Measures: Normalized amplitudes 100ms pre- and 200ms post-initial heel contact, time of onset activation relative to initial contact, and percent of activation time across the stride cycle were calculated for each muscle in each condition.

Results: The pre-contact amplitudes of the peroneus longus and lateral gastrocnemius and the post-contact amplitudes of the lateral gastrocnemius were significantly greater in the ADB and ADS conditions. In the ADB condition, the rectus femoris and biceps femoris post-contact amplitudes were significantly greater than shod. The peroneus longus and lateral gastrocnemius were activated significantly earlier and the anterior tibialis, lateral gastrocnemius, and rectus femoris were activated significantly longer across the stride cycle in the ADB and the ADS conditions. In addition, the peroneus longus was activated significantly longer in the ADB condition when compared to shod.

Conclusions: Both ankle destabilization devices caused an alteration in muscle activity during walking, which may be favorable to an injured patient. Therefore, implementing these devices in rehabilitation programs may be beneficial to improving neuromuscular control.

Key Words: Chronic ankle instability, gait, rehabilitation

Coalition

Foot Ankle Int. 2014 Jan 23.

Treatment of Naviculo-First Cuneiform Coalition of the Foot.

Byun SE, Lee HS, Ahn JY, Seo DK, Seo JH.
Author information

Abstract

BACKGROUND:
Naviculo-first cuneiform coalition is a rare form of tarsal coalition with few reports. We therefore have analyzed its clinical features and the results of treatment.

METHODS:
We analyzed 36 feet in 28 patients diagnosed with naviculo-first cuneiform coalition from January 2003 to December 2010. The 28 patients were 10 males and 18 females, with 18 right and 18 left feet, including 8 patients with bilateral coalition. The location and morphological pattern of naviculo-first cuneiform coalition were analyzed radiologically. Symptomatic patients initially received conservative management for 6 months. Six feet of 5 patients were treated operatively, 3 feet by curettage and 3 by fusion.

RESULTS:
Eighteen feet had symptoms, while 18 feet without symptoms were diagnosed incidentally. Mean patient age at diagnosis was 34.6 years (range, 10-68 years). The mean age at diagnosis of symptomatic patients was 29.6 years (range, 10-50 years). Coalitions were located mainly in the medioplantar area. There was no bony coalition. Computed tomography or magnetic resonance imaging showed a cystic pattern in 7 patients, an irregular pattern in 4, a combined pattern in 5, and a spur-forming pattern in 1. The mean American Orthopaedic Foot & Ankle Society scores at the last follow-up in patients treated conservatively and operatively were 95.3 (range, 87-100) and 83.5 (range, 70-95), respectively. Among the 5 operated patients, 3 patients (60%) complained of pain, including 2 who received curettage and 1 who developed a nonunion after attempted fusion.

CONCLUSION:
Conservative treatment should be considered over surgery in treating naviculo-first cuneiform coalition.

LEVEL OF EVIDENCE: Level III, comparative case series.
KEYWORDS: first naviculo–cuneiform coalition, naviculo–first cuneiform coalition, tarsal coalition PMID: 24459204

Ankle motion

Ankle kinematics and performance on the Y-balance test are associated with inclinometer measurements on the weight-bearing lunge test □

Journal of Sport Rehabilitation, 01/22/2014 **Evidence Based Medicine**
Kang MH, et al.

Context: Ankle dorsiflexion range of motion has been often measured under the weight-bearing condition in the clinical setting; however, little is known about the relationship between weight-bearing lunge test (WBLT) and both ankle kinematics and performance on dynamic postural control tests.

Objective: To examine whether ankle kinematics and performance on the Lower Quarter Y-Balance Test™ (YBT™-LQ) are correlated with results of the WBLT using an inclinometer and tape measure.

Design: Cross-sectional design. ***Setting:*** University motion analysis laboratory. ***Participants:*** Thirty physically active participants. ***Interventions:*** None.

Main Outcome Measures: The WBLT was evaluated using an inclinometer (°) and a tape measure (cm). The reach distances in the anterior, posteromedial, and posterolateral directions on the YBT™-LQ were normalized by limb length. Ankle dorsiflexion during the YBT™-LQ was recorded using a 3-D motion-analysis system. Simple linear regression was used to examine the relationship between the WBLT results and both ankle dorsiflexion and the normalized reach distance in each direction on the YBT™-LQ.

Results: The WBLT results were significantly correlated with ankle dorsiflexion in all directions on the YBT™-LQ ($p < 0.05$). A strong correlation was found between the inclinometer measurement of the WBLT and ankle dorsiflexion ($r = 0.74$, $r2 = 0.55$), whereas the tape measure results on the WBLT were moderately correlated with ankle dorsiflexion ($r = 0.64$, $r2 = 0.40$) during the anterior reach on the YBT™-LQ. Only the normalized anterior reach distance was significantly correlated with the results for the inclinometer ($r = 0.68$, $r2 = 0.46$) and the tape measure ($r = 0.64$, $r2 = 0.41$) on the WBLT.

Conclusions: Inclinometer measurements on the WBLT can be an appropriate tool for predicting the amount of ankle dorsiflexion during the YBT™-LQ. Furthermore, WBLT should be measured in those who demonstrate poor dynamic balance.

Keywords: ankle joint, biomechanics, dynamic postural control, range of motion

ANKLE/INSTABILITY

Muscle activation changes

Lower extremity muscle activation during functional exercises in patients with and without chronic ankle instability

PM&R, 01/10/2014

Feger MA, et al.

Abstract

Objective

To determine if individuals with chronic ankle instability (CAI) exhibited altered neuromuscular control as demonstrated by surface EMG amplitudes compared to healthy controls during single limb eyes closed balance, Star Excursion Balance Test, forward lunge, and lateral hop exercises. Design: Cross-sectional laboratory study

Setting

Laboratory

Participants

Fifteen young adults with CAI and 15 healthy controls.

Interventions

Subjects performed functional exercises while surface EMG signals were recorded from the tibialis anterior, peroneus longus, lateral gastrocnemius, rectus femoris, biceps femoris, and gluteus medius.

Main Outcome Measures

Surface EMG amplitudes (RMS area) for each muscle, muscles of the shank (distal three muscles), muscles of the thigh (proximal three muscles), and total muscle activity (all six muscles) of the lower extremity were analyzed and compared between groups.

Results

Individuals with CAI demonstrated significantly less EMG activity in the muscles of the lower extremity during all four functional exercises. Effect sizes for significant differences between groups ranged from (-0.75 to -1.08), none of which had 95% confidence intervals that crossed zero, indicating moderate to large decreases in muscle activity in patients with CAI compared to healthy controls.

Conclusions

Patients with CAI demonstrate decreased muscle activity of ankle, knee, and hip musculature during common functional rehabilitative tasks. Clinicians may benefit from implementing functional exercises for patients with CAI that target both distal and proximal muscles of the lower extremity.

Bracing vs. NMR

Br J Sports Med. 2014 Jan 7. doi: 10.1136/bjsports-2013-092947.

Bracing superior to neuromuscular training for the prevention of self-reported recurrent ankle sprains: a three-arm randomised controlled trial.

Janssen KW, van Mechelen W, Verhagen EA.
Author information

Abstract

BACKGROUND:
Ankle sprain is the most common sports-related injury with a high rate of recurrence and associated costs. Recent studies have emphasised the effectiveness of both neuromuscular training and bracing for the secondary prevention of ankle sprains.

AIM:
To evaluate the effectiveness of combined bracing and neuromuscular training, or bracing alone, against the use of neuromuscular training on recurrences of ankle sprain after usual care.

METHODS:
384 athletes, aged 18-70, who had sustained a lateral ankle sprain, were included (training group n=120; brace group n=126; combi group n=138). The training group received an 8-week home-based neuromuscular training programme, the brace group received a semirigid ankle brace to be worn during all sports activities for 12 months, and the combi group received both the training programme, as well as the ankle brace, to be worn during all sports activities for 8 weeks. The main outcome measure was self-reported recurrence of the ankle sprain.

RESULTS:
During the 1-year follow-up, 69 participants (20%) reported a recurrent ankle sprain: 29 (27%) in the training group, 17 (15%) in the brace group and 23 (19%) in the combi group. The relative risk for a recurrent ankle sprain in the brace group versus the training group was 0.53 (95% CI 0.29 to 0.97). No significant differences were found for time losses or costs due to ankle sprains between the intervention groups.

CONCLUSIONS:
Bracing was superior to neuromuscular training in reducing the incidence but not the severity of self-reported recurrent ankle sprains after usual care.

KEYWORDS: Ankle injuries, Injury Prevention, Intervention effectiveness, Issues related to taping and bracing, Sports rehabilitation programs PMID: 24398222

Peds flatfoot

Curr Opin Pediatr. 2014 Feb;26(1):93-100. doi: 10.1097/MOP.0000000000000039.

Pediatric flatfoot: cause, epidemiology, assessment, and treatment.

Dare DM, Dodwell ER.
Author information

Abstract

PURPOSE OF REVIEW:
The current review includes the most up to date literature on the cause, epidemiology, diagnosis, and treatment of pediatric flatfeet.

RECENT FINDINGS:
Recent systematic reviews concur that the evidence supporting the use of orthotics in pediatric flexible flatfeet is poor. Multiple studies have recently reported on the results of arthroereisis, yet these are mostly retrospective and do not include a comparative group or long-term follow up. Other options for symptomatic flatfeet may include osteotomies and/or fusions, but similarly high quality comparative studies are lacking.

SUMMARY:
Pediatric flatfeet range from the painless flexible normal variant of growth, to stiff or painful manifestations of tarsal coalition, collagen abnormalities, neurologic disease, or other underlying condition. Most children with flexible flatfeet do not have symptoms and do not require treatment. In symptomatic children, orthotics, osteotomies, or fusions may be considered. Arthroereisis has gained popularity in Europe, but has not been widely adopted in North America. Children with asymptomatic rigid flatfeet may not require treatment, whereas those with pain or functional deficits may benefit from orthotics, osteotomies, or fusions. A careful history, clinical exam, and selective diagnostic testing can be used to determine the appropriate treatment option for each child.

PMID: 24346183

Conservative management of ankle sprain

Foot Ankle Int. 2014 Jan 13.

A Comparative, Prospective, and Randomized Study of Two Conservative Treatment Protocols for First-episode Lateral Ankle Ligament Injuries.

Prado MP, Mendes AA, Amodio DT, Camanho GL, Smyth NA, Fernandes TD.
Author information

Abstract

BACKGROUND:
The objective of this study was to investigate functional results, the amount of time that patients missed from regular working activities, and the incidence of residual mechanical ankle instability following conservative treatment of a first episode of severe lateral ankle ligament sprain (with articular instability).

METHODS:
This prospective and randomized study included 186 patients with severe lateral ankle ligament injuries, who were randomly assigned into 2 conservative treatment groups. In group A, participants were treated with a walking boot with weight-bearing allowed, pain management, ice, and elevation with restricted joint mobilization for 3 weeks. In group B, patients were treated with a functional brace for 3 weeks. After this period, patients from both groups were placed in a short, functional brace for an additional 3 weeks, during which they also started a rehabilitation program.

RESULTS:
No statistically significant difference was found in pain intensity score between the 2 groups; however, functional evaluations based on the AOFAS ankle and hindfoot score system showed a statistically significant improvement in the group treated with the functional brace. In addition, the average recovery period necessary for patients of group B to resume their duties was shorter than that for patients in group A. No significant difference was detected in residual mechanical ankle instability between the 2 groups.

CONCLUSION:
Patients with severe lateral ankle ligament lesions treated with a functional brace were shown to exhibit somewhat better results than those treated with a walking boot, and both methods presented a very low incidence of residual chronic instability. We found adequate conservative treatment was sufficient to reestablish ankle stability and that functional treatment had a marginally better clinical short-term outcome with a shorter average recovery period.

LEVEL OF EVIDENCE: Level I, prospective randomized study.
KEYWORDS: acute ankle sprain, conservative treatment, functional treatment, residual instability PMID: 24419825

Mechanical changes

Clin J Sport Med. 2014 Jan;24(1):62-8. doi: 10.1097/01.jsm.0000432858.86929.80.

Ankle kinematics and muscle activity in functional ankle instability.

Monteleone BJ, Ronsky JL, Meeuwisse WH, Zernicke RF.
Author information

Abstract

OBJECTIVE:
Following an ankle injury, many patients have functional ankle instability (FAI) with an increased predisposition to reinjury. The purpose of this study was to assess the effects of FAI on ankle kinematics and muscle activity during a lateral hop movement.

DESIGN:
Cross-sectional and observational study; all data collection for each subject was performed on 1 day.

SETTING:
Clinical biomechanics laboratory.

PATIENTS:
Two groups were studied: (1) Control group-no ankle injury (n = 12), and (2) FAI group (n = 12).

INTERVENTIONS:
The lateral hop movement consisted of multiple lateral and medial 1-legged hops over an obstacle (width, 72.5 cm; depth, 25.5 cm; height, 14.3 cm) onto adjacent force platforms. Each subject was instructed to perform as many lateral hops as possible during the 6-second trial. Means, SDs, 95% confidence intervals of the differences, and P-values were calculated.

MAIN OUTCOME MEASURES:
Ankle kinematics and muscle activity throughout the lateral hop movement.

RESULTS:
Significant differences existed between groups for mean (SD) dorsiflexion ankle positions-FAI 82.4 degrees (6.4) versus normal 75.2 degrees (10.1) and tibialis anterior normalized muscle activity-FAI 0.27 (0.21) versus normal 0.16 (0.13) at ground contact.

CONCLUSIONS:
The FAI group revealed greater tibialis anterior muscle activity and dorsiflexion ankle position at contact moving in the lateral direction. These differences between groups may have been related to an inherent predisposition to ankle injuries, a preexisting difference in task performance, a consequence of injuries, or a compensatory adaptation to previous injuries.

PMID: 24231927

Plantar surface

Plasma vs. cortisone for plantar fasciitis

Foot Ankle Int. 2014 Jan 13.

Platelet-Rich Plasma Efficacy Versus Corticosteroid Injection Treatment for Chronic Severe Plantar Fasciitis.

Monto RR.

Author information

Abstract

BACKGROUND:
Chronic plantar fasciitis is a common orthopedic condition that can prove difficult to successfully treat. In this study, autologous platelet-rich plasma (PRP), a concentrated bioactive blood component rich in cytokines and growth factors, was compared to traditional cortisone injection in the treatment of chronic cases of plantar fasciitis resistant to traditional nonoperative management.

METHODS:
Forty patients (23 females and 17 males) with unilateral chronic plantar fasciitis that did not respond to a minimum of 4 months of standardized traditional nonoperative treatment modalities were prospectively randomized and treated with either a single ultrasound guided injection of 3 cc PRP or 40 mg DepoMedrol cortisone. American Orthopedic Foot and Ankle Society (AOFAS) hindfoot scoring was completed for all patients immediately prior to PRP or cortisone injection (pretreatment = time 0) and at 3, 6, 12, and 24 months following injection treatment. Baseline pretreatment radiographs and MRI studies were obtained in all cases to confirm the diagnosis of plantar fasciitis.

RESULTS:
The cortisone group had a pretreatment average AOFAS score of 52, which initially improved to 81 at 3 months posttreatment but decreased to 74 at 6 months, then dropped to near baseline levels of 58 at 12 months, and continued to decline to a final score of 56 at 24 months. In contrast, the PRP group started with an average pretreatment AOFAS score of 37, which increased to 95 at 3 months, remained elevated at 94 at 6 and 12 months, and had a final score of 92 at 24 months.

CONCLUSIONS:
PRP was more effective and durable than cortisone injection for the treatment of chronic recalcitrant cases of plantar fasciitis.

LEVEL OF EVIDENCE: Level I, prospective randomized comparative series.
KEYWORDS: PRP, cortisone injection, heel pain, plantar fasciitis, platelet-rich plasma PMID: 24419823

Plantar fascia

J Anat. 2013 Dec;223(6):665-76. doi: 10.1111/joa.12111. Epub 2013 Sep 12.

Plantar fascia anatomy and its relationship with Achilles tendon and paratenon.

Stecco C, Corradin M, Macchi V, Morra A, Porzionato A, Biz C, De Caro R.

Department of Molecular Medicine, University of Padua, Padova, Italy.

Abstract Although the **plantar fascia** (PF) has been studied quite well from a biomechanical viewpoint, its microscopic properties have been overlooked: nothing is known about its content of elastic fibers, the features of the extracellular matrix or the extent of innervation. From a functional and clinical standpoint, the PF is often correlated with the triceps surae muscle, but the anatomical grounds for this link are not clear.

The aim of this work was to focus on the PF macroscopic and microscopic properties and study how **Achilles tendon** diseases might affect it. Twelve feet from unembalmed human cadavers were dissected to isolate the PF. Specimens from each PF were tested with various histological and immunohistochemical stains. In a second stage, 52 magnetic resonance images (MRI) obtained from patients complaining of aspecific ankle or foot pain were analyzed, dividing the cases into two groups based on the presence or absence of signs of degeneration and/or inflammation of the **Achilles tendon**. The thickness of PF and **paratenon** was assessed in the two groups and statistical analyses were conducted. The PF is a tissue firmly joined to **plantar** muscles and skin. Analyzing its possible connections to the sural structures showed that this **fascia** is more closely connected to the **paratenon** of **Achilles tendon** than to the **Achilles tendon**, through the periosteum of the heel. The PF extended medially and laterally, continuing into the deep fasciae enveloping the abductor hallucis and abductor digiti minimi muscles, respectively. The PF was rich in hyaluronan, probably produced by fibroblastic-like cells described as 'fasciacytes'. Nerve endings and Pacini and Ruffini corpuscles were present, particularly in the medial and lateral portions, and on the surface of the muscles, suggesting a role for the PF in the proprioception of foot. In the radiological study, 27 of the 52 MRI showed signs of **Achilles tendon** inflammation and/or degeneration, and the PF was 3.43 ± 0.48 mm thick (99%CI and SD = 0.95), as opposed to 2.09 ± 0.24 mm (99%CI, SD = 0.47) in the patients in which the MRI revealed no **Achilles tendon** diseases; this difference in thickness of 1.29 ± 0.57 mm (99%CI) was statistically significant ($P < 0.001$). In the group of 27/52 patients with tendinopathies, the PF was more than 4.5 mm thick in 5, i.e. they exceeded the threshold for a diagnosis of **plantar** fasciitis. None of the other 25/52 paitents had a PF more than 4 mm thick. There was a statistically significant correlation between the thicknesses of the PF and the **paratenon**.

These findings suggest that the **plantar fascia** has a role not only in supporting the longitudinal arch of the foot, but also in its proprioception and peripheral motor coordination. Its **relationship** with the **paratenon** of the **Achilles tendon** is consistent with the idea of triceps surae structures being involved in the PF pathology, so their rehabilitation can be considered appropriate. Finally, the high concentration of hyaluronan in the PF points to the feasibility of using hyaluronan injections in the **fascia** to treat **plantar** fasciitis.

MANUAL THERAPY

Training in school

JMMT **Volume 21 Issue 4 (November, 2013), pp. 177-186**

Development and outcomes of a program to translate the evidence for spinal manipulation into physical therapy practice

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[1]Park Nicollet Health Services, USA, [2]University of Utah, Intermountain Healthcare, UT, USA

Objectives: To describe a program to translate evidence into practice for the use of manipulation with a sub-group of patients with low back pain and report the program's outcomes following implementation. We compared outcomes based on appropriate inclusion in the program and compliance with the evidence being translated.

Methods: The evidence translation program was based on evidence that patients meeting two criteria (duration of symptoms ,16 days, no symptoms distal to knee) were likely to respond to a physical therapy that included manipulation in the first two visits. Implementation addressed potential barriers with referring physicians, physical therapists, and scheduling staff to this evidence. Outcomes for patients in the program were tracked following implementation. Process outcomes were appropriateness of inclusion (met both criteria), compliance with evidence for providing thrust manipulation in the first two visits, and number of physical therapy visits. Clinical outcomes were based on Oswestry scores from the first, interim (after two to three visits), and final visit.

Results: A total of 577 patients entered the evidence translation program (mean age 5 43.0, 56.8% female); 79.5% were appropriate inclusions and 83.0% received manipulation. The use of manipulation was associated with fewer visits (mean difference 5 0.54 visits, 95% CI: 0.037, 1.04, P 5 0.035), and appropriate inclusion was associated with greater Oswestry change (mean difference at the final visit 5 6.6 points, 95% CI: 1.6, 11.6; P 5 0.010).

Discussion: Implementing evidence into practice is difficult; however, barriers can be anticipated and overcome. Tracking the outcomes of an implementation program is critical to evaluating its benefit to patients. Additional research using experimental designs are necessary to evaluate the effectiveness of various treatments implemented in physical therapy practice.

Manipulation of C spine

Man Ther. 2014 Jan 11. pii: S1356-689X(13)00214-2. doi: 10.1016/j.math.2013.12.002.

Is one better than another?: A randomized clinical trial of manual therapy for patients with chronic neck pain.

Izquierdo Pérez H1, Alonso Perez JL2, Gil Martinez A3, La Touche R3, Lara SL4, Commeaux Gonzalez N5, Arribas Perez H6, Bishop MD7, Fernández-Carnero J8.

Abstract

Our purpose was to compare the effectiveness of three manual therapy techniques: high velocity, low amplitude (HVLA), mobilization (Mob) and sustained natural apophyseal glide (SNAG) in patients with chronic neck pain (CNP). The randomized controlled trial included patients with mechanically reproducible CNP, who were randomized to the treatment group. Outcome measures were the Visual Analogue scale (VAS), Neck Disability Index (NDI), Global Rating of Change (GROC) and Cervical Range of Motion (CROM). Two-way repeated measures analysis of variance compared outcomes at baseline, at the end of treatment and 1, 2 and 3 months after treatment. A total of 51 subjects completed the trial. No significant differences were found between HVLA, Mob and SNAG at the end of treatment and during the follow-up in any of the analysed outcomes.

There were no differences in satisfaction for all techniques. The results lead to the conclusion that there is no long-term difference between the application of HVLA, Mob and SNAG in pain, disability and cervical range of motion for patients with CNP.

KEYWORDS: Chronic neck pain, Manual therapy, Musculoskeletal manipulations, Randomized controlled trial PMID: 24467843

Water diffusion after manipulation/Lumbar spine

Journal of Orthopaedic & Sports Physical Therapy, 2014, **Volume:** 44 **Issue:** 1 **Pages:** 19-29
doi:10.2519/jospt.2014.4967

The Within-Session Change in Low Back Pain Intensity Following Spinal Manipulative Therapy Is Related to Differences in Diffusion of Water in the Intervertebral Discs of the Upper Lumbar Spine and L5-S1

Authors: Paul F. Beattie, PT, PhD, OCS, FAPTA[1], Raymond Butts, DPT, PhD[2], Jonathan W. Donley, DPT, ATC[2], Derek M. Liuzzo, DPT[1]

Study DesignSingle-group, prospective, repeated-measures design with responder analysis.

ObjectiveTo determine differences in the changes in diffusion of water within the lumbar intervertebral discs between participants with low back pain who reported a within-session reduction in pain intensity following a single treatment of spinal manipulative therapy and those who did not.

BackgroundThere is a paucity of research that describes the physiologic events associated with analgesia following intervention for low back pain. Postintervention increases in the diffusion of water within various soft tissues of the spine may be one of many potential mechanisms linked to pain reduction.

MethodsNineteen adults between 20 and 45 years of age participated in this study. All participants reported low back pain of at least 2 on an 11-point (0–10) verbally administered numeric pain rating scale at the time of enrollment. Participants underwent T2- and diffusion-weighted lumbar magnetic resonance imaging scans immediately before and after receiving a single treatment of spinal manipulative therapy. Individuals who reported a decrease in current pain intensity of more than 2 following treatment were classified as “within-session responders,” and the remainder were classified as “not-within-session responders.” The apparent diffusion coefficient (ADC), representing the diffusion of water in the nucleus pulposus, was calculated from ADC maps derived from the midsagittal diffusion-weighted images.

Results Two-way, repeated-measures analyses of variance indicated significant group-by-time interactions. Participants in the within-session-responder group (n = 12) had a postintervention increase in ADC at L1-2 (P = .001), L2-3 (P = .002), and L5-S1 (P = .01) compared to those in the not-within-session-responder group (n = 7). Large effect sizes in ADC between responder groups were observed at L1-2 (d = 1.74), L2-3 (d = 1.83), and L5-S1 (d = 1.49). No significant group-by-time interactions were observed at the L3-4 and L4-5 levels.

Conclusion Changes in the diffusion of water within the lumbar intervertebral discs at the L1-2, L2-3, and L5-S1 levels appear to be related to differences in within-session pain reports following a single treatment of spinal manipulative therapy. *J Orthop Sports Phys Ther 2014;44(1):19–29. Epub 21 November 2013. doi:10.2519/jospt.2014.4967*

Keyword: lumbar spine, magnetic resonance imaging, manual therapy

Muscle palpation

Clin J Pain. 2014 Feb;30(2):174-82. doi: 10.1097/AJP.0b013e31828c893d.

Standardization of muscle palpation- methodological considerations.

Kothari SF, Kothari M, Zambra RF, Baad-Hansen L, Svensson P.
Author information

Abstract

OBJECTIVES:
To compare test-retest variability of palpation between a new palpometer and manual palpation using (1) right or left hand, (2) index or middle finger, (3) randomized or fixed sequence of force levels, (4) palpation on soft or hard surface, and (5) palpation for 2 or 10 seconds.

METHODS:
Twelve clinicians were instructed to target 0.5, 1.0, and 2.0 kg on a force meter using a palpometer (adjustable spring-coil with a small pin touching the examiner's hand when the correct pressure is achieved) and manual palpation with right or left hand, index or middle finger, randomized or fixed sequence of force levels, on hard or soft surface, and for 2 or 10 seconds. During all experiments, 10 force measures were taken and variability was determined as coefficient of variation (CV) and compared with analyses of variance.

RESULTS:
In all experiments, the palpometer had lower variability compared with manual palpation ($P<0.001$). There were no differences between the CVs of right and left hand ($P=0.122$), index and middle finger ($P=0.240$), and soft and hard surface ($P=0.240$). Random sequence of force levels had higher CVs than fixed sequence with manual palpation ($P=0.004$), but not with palpometer ($P=0.856$). CVs for 2 seconds palpation were higher than 10 seconds ($P=0.002$).

CONCLUSIONS:
The palpometer had low test-retest variability and provided a more accurate and reproducible pressure stimulus than manual palpation. The findings of this study may help to standardize palpation of human muscles required for accurate and reliable diagnosis of musculoskeletal pain conditions.

PMID: 24398392

T spine manip for TMJ

Am J Phys Med Rehabil. 2014 Feb;93(2):160-8. doi: 10.1097/PHM.0000000000000031.

Effects of upper thoracic manipulation on pressure pain sensitivity in women with temporomandibular disorder: a randomized, double-blind, clinical trial.

Packer AC, Pires PF, Dibai-Filho AV, Rodrigues-Bigaton D.
Author information

Abstract

OBJECTIVE:
The aim of the present study was to evaluate the effects of upper thoracic manipulation on pain in subjects with temporomandibular disorder.

DESIGN:
Thirty-two women with a diagnosis of temporomandibular disorder were randomly allocated to an experimental group (n = 16), submitted to upper thoracic manipulation, and a placebo group (n = 16), submitted to a procedure in the thoracic region with no therapeutic effect. All volunteers underwent an evaluation of pain in the masticatory muscles and the temporomandibular joint using an algometer and the visual analog scale before and immediately after the procedure as well as after 48-72 hrs. Two-way repeated-measures analysis of variance was used for the intragroup and intergroup analyses, with the level of significance set to 5% ($P < 0.05$). Cohen d was calculated for the determination of the effect size.

RESULTS:
No significant group-by-time interaction was found ($P > 0.05$) for algometry in any analysis, and Cohen d revealed no significant effect of the treatment. Moreover, no significant group-by-time interaction was found for facial pain intensity determined using the visual analog scale ($P > 0.05$), and Cohen d also revealed no significant effect of the treatment regarding this variable.

CONCLUSIONS:
On the basis of the present findings, upper thoracic spinal manipulation does not lead to a reduction in pain in women with temporomandibular disorder.

PMID: 24434889

C spine mobilization

Pain Med. 2014 Jan 8. doi: 10.1111/pme.12329.

Three-Dimensional Computerized Mobilization of the Cervical Spine for the Treatment of Chronic Neck Pain: A Pilot Study.

River Y, Aharony S, Bracha J, Levital T, Gerwin R.
Author information

Abstract

BACKGROUND:
Manual therapies for chronic neck pain are imprecise, inconsistent, and brief due to therapist fatigue. A previous study showed that computerized mobilization of the cervical spine in the sagittal plane is a safe and potentially effective treatment of chronic neck pain.

OBJECTIVE:
To investigate the safety and efficacy of computerized mobilization of the cervical spine in a three-dimensional space for the treatment of chronic neck pain.

DESIGN:
Pilot, open trial.

SETTING:
Physical therapy outpatient department.

PARTICIPANTS:
Nine patients with chronic neck pain.

INTERVENTIONS:
A computerized cradle capable of three-dimensional neck mobilizations was used. Treatment sessions lasted 20 minutes, biweekly, for six weeks.

MAIN OUTCOME MEASURES:
Visual analog scale (VAS) for pain, cervical range of motion (CROM), neck disability index (NDI), joint position error (JPE), and muscle algometry.

RESULTS:
Comparing baseline at week one with week six (end of treatment), the VAS scores dropped by 2.9 points ($P < 0.01$). The six directions of movement studied by the CROM showed a combined increase of 11% ($P = 0.01$). The NDI decreased significantly from 16 to 10 ($P = 0.03$), and the JPE decreased significantly from 3.7° to 1.9° ($P = 0.047$). There was no change in the pressure pain threshold in any muscle tested. There were no significant adverse effects.

CONCLUSIONS:
These preliminary results demonstrate that this novel, computerized, three-dimensional cervical mobilization device is probably safe. The data also suggest that this method is effective in alleviating neck pain and associated headache, and in increasing the CROM, although the sample size was small in this open trial.

KEYWORDS: Manual Therapy, Neck Pain, Three-Dimensional Computerized Cervical Mobilization PMID: 24400987

Patient illness pereption

Man Ther. 2013 Nov 23. pii: S1356-689X(13)00193-8. doi: 10.1016/j.math.2013.11.006.

Physical therapists should integrate illness perceptions in their assessment in patients with chronic musculoskeletal pain; a qualitative analysis.

van Wilgen P1, Beetsma A2, Neels H3, Roussel N4, Nijs J5.
Author information

Abstract

In the past decade, scientific evidence has shown that the biomedical model falls short in the treatment of patients with musculoskeletal pain. To understand musculoskeletal pain and a patient's health behavior and beliefs, physical therapists should assess the illness perceptions of their patients. In this quantitative study, we audiotaped the assessments of 19 primary care physical therapists on 27 patients and analyzed if and how illness perceptions were assessed. The Common Sense Model was used as the theoretical framework.

We conclude that some of the domains of the Common Sense Model were frequently asked for (identity, causes and consequences), while others (timeline, treatment control, coherence, emotional representation) were used less frequently or seldom mentioned. The overall impression was that the assessments of the physical therapists were still bio-medically oriented in these patients with chronic musculoskeletal pain.

KEYWORDS: Illness perceptions, Musculoskeletal pain, Qualitative study PMID: 24389339

P/A mobs lumbar spine

J Manipulative Physiol Ther. 2014 Jan;37(1):32-41. doi: 10.1016/j.jmpt.2013.09.004. Epub 2013 Nov 12.

Neural responses of posterior to anterior movement on lumbar vertebrae: a functional magnetic resonance imaging study.

Meier ML1, Hotz-Boendermaker S2, Boendermaker B3, Luechinger R4, Humphreys BK5.
Author information

Abstract

OBJECTIVE:
The purpose of this study was to develop and test a clinically relevant method to mechanically stimulate lumbar functional spinal units while recording brain activity by means of functional magnetic resonance imaging (MRI).

METHODS:
Subjects were investigated in the prone position with their face lying on a modified stabilization pillow. To minimize head motion, the pillow was fixed to the MRI headrest, and supporting straps were attached around the shoulders. An experienced manual therapist applied controlled, nonpainful pressure stimuli to 10 healthy subjects at 3 different lumbar vertebrae (L1, L3, and L5). Pressure applied to the thumb was used as a control. The stimulation consisted of posterior to anterior (PA) pressure movement. The therapist followed a randomized stimulation protocol projected onto a screen in the MRI room. Blood oxygenation level-dependent responses were analyzed in relation to the lumbar and the thumb stimulations. The study was conducted by the Chiropractic Department, Faculty of Medicine, University of Zürich, Switzerland.

RESULTS:
No participant reported any discomfort due to the prone-lying position or use of the pillow. Importantly, PA-induced pressure produced only minimal head movements. Stimulation of the lumbar spinous processes revealed bilateral neural responses in medial parts of the postcentral gyrus (S1). Additional activity was observed in the secondary somatosensory cortex (S2), posterior parts of the insular cortex, different parts of the cingulate cortex, and the cerebellum. Thumb stimulations revealed activation only in lateral parts of the contralateral S1.

CONCLUSION:
The current study demonstrates the feasibility of the application of PA pressure on lumbar spinous processes in an MRI environment. This approach may serve as a promising tool for further investigations regarding neuroplastic changes in chronic low back pain subjects.

KEYWORDS: Chiropractic, Chronic Pain, Low Back Pain, Magnetic Resonance Imaging Functional, Manual Therapies PMID: 24229849

Therapist patient relationship

BMC Complement Altern Med. 2014 Jan 13;14(1):16.

A path analysis of the effects of the doctor-patient encounter and expectancy in an open-label randomized trial of spinal manipulation for the care of low back pain.

Haas M, Vavrek D, Neradilek MB, Polissar N.

Abstract

BACKGROUND:

The doctor-patient encounter (DPE) and associated patient expectations are potential confounders in open-label randomized trials of treatment efficacy. It is therefore important to evaluate the effects of the DPE on study outcomes.

METHODS:

Four hundred participants with chronic low back pain (LBP) were randomized to four dose groups: 0, 6, 12, or 18 sessions of spinal manipulation from a chiropractor. Participants were treated three times per week for six weeks. They received light massage control at visits when manipulation was not scheduled. Treating chiropractors were instructed to have equal enthusiasm for both interventions. A path analysis was conducted to determine the effects of dose, patient expectations of treatment success, and DPE on LBP intensity (100-point scale) at the end of care (6 weeks) and primary endpoint (12 weeks). Direct, indirect, and total standardized effects (betatotal) were computed. Expectations and DPE were evaluated on Likert scales. The DPE was assessed as patient-rated perception of chiropractor enthusiasm, confidence, comfort with care, and time spent.

RESULTS:

The DPE was successfully balanced across groups, as were baseline expectations. The principal finding was that the magnitude of the effects of DPE on LBP at 6 and 12 weeks (|beta|total = 0.22 and 0.15, $p < .05$) were comparable to the effects of dose of manipulation at those times (|beta|total = 0.11 and 0.12, $p < .05$). In addition, baseline expectations had no notable effect on follow-up LBP. Subsequent expectations were affected by LBP, DPE, and dose ($p < .05$).

CONCLUSIONS:

The DPE can have a relatively important effect on outcomes in open-label randomized trials of treatment efficacy. Therefore, attempts should be made to balance the DPE across treatment groups and report degree of success in study publications. We balanced the DPE across groups with minimal training of treatment providers.Trial registration: ClinicalTrials.gov NCT00376350.

PMID: 24410959

J Manipulative Physiol Ther. 2014 Jan;37(1):22-31. doi: 10.1016/j.jmpt.2013.07.008. Epub 2013 Nov 15.

Changes in vertebral artery blood flow following various head positions and cervical spine manipulation.

Quesnele JJ1, Triano JJ2, Noseworthy MD3, Wells GD4.
Author information

Abstract

OBJECTIVE:
The objective of the study was to investigate the cerebrovascular hemodynamic response of cervical spine positions including rotation and cervical spine manipulation in vivo using magnetic resonance imaging technology on the vertebral artery (VA).

METHODS:
This pilot study was conducted as a blinded examiner cohort with 4 randomized clinical tasks. Ten healthy male participants aged 24 to 30 years (mean, 26.8 years) volunteered to participate in the study. None of the participants had a history of disabling neck, arm, or headache pain within the last 6 months. They did not have any current or history of neurologic symptoms. In a neutral head position, physiologic measures of VA blood flow and velocity at the C1-2 spinal level were obtained using phase-contrast magnetic resonance imaging after 3 different head positions and a chiropractic upper cervical spinal manipulation. A total of 30 flow-encoded phase-contrast images were collected over the cardiac cycle, in each of the 4 conditions, and were used to provide a blood flow profile for one complete cardiac cycle. Differences between flow (in milliliters per second) and velocity (in centimeters per second) variables were evaluated using repeated-measures analysis of variance.

RESULTS:
The side-to-side difference between ipsilateral and contralateral VA velocities was not significant for either velocities (P = .14) or flows (P = .19) throughout the conditions. There were no other interactions or trends toward a difference for any of the other blood flow or velocity variables.

CONCLUSIONS:
There were no significant changes in blood flow or velocity in the vertebral arteries of healthy young male adults after various head positions and cervical spine manipulations.

KEYWORDS: Blood Flow Velocity, Chiropractic, Head Movements, Hemodynamic, Manipulation Spinal, Vertebral Artery, Vertebrobasilar Insufficiency PMID: 24239451

C spine chiro manips

J Manipulative Physiol Ther. 2014 Jan;37(1):42-63. doi: 10.1016/j.jmpt.2013.08.010. Epub 2013 Nov 19.

Evidence-based guidelines for the chiropractic treatment of adults with neck pain.

Bryans R1, Decina P2, Descarreaux M3, Duranleau M4, Marcoux H5, Potter B6, Ruegg RP7, Shaw L8, Watkin R9, White E10.
Author information

Abstract

OBJECTIVE:
The purpose of this study was to develop evidence-based treatment recommendations for the treatment of nonspecific (mechanical) neck pain in adults.

METHODS:
Systematic literature searches of controlled clinical trials published through December 2011 relevant to chiropractic practice were conducted using the databases MEDLINE, EMBASE, EMCARE, Index to Chiropractic Literature, and the Cochrane Library. The number, quality, and consistency of findings were considered to assign an overall strength of evidence (strong, moderate, weak, or conflicting) and to formulate treatment recommendations.

RESULTS:
Forty-one randomized controlled trials meeting the inclusion criteria and scoring a low risk of bias were used to develop 11 treatment recommendations. Strong recommendations were made for the treatment of chronic neck pain with manipulation, manual therapy, and exercise in combination with other modalities. Strong recommendations were also made for the treatment of chronic neck pain with stretching, strengthening, and endurance exercises alone. Moderate recommendations were made for the treatment of acute neck pain with manipulation and mobilization in combination with other modalities. Moderate recommendations were made for the treatment of chronic neck pain with mobilization as well as massage in combination with other therapies. A weak recommendation was made for the treatment of acute neck pain with exercise alone and the treatment of chronic neck pain with manipulation alone. Thoracic manipulation and trigger point therapy could not be recommended for the treatment of acute neck pain. Transcutaneous nerve stimulation, thoracic manipulation, laser, and traction could not be recommended for the treatment of chronic neck pain.

CONCLUSIONS:
Interventions commonly used in chiropractic care improve outcomes for the treatment of acute and chronic neck pain. Increased benefit has been shown in several instances where a multimodal approach to neck pain has been used.

 KEYWORDS: Chiropractic, Evidence-Based Practice, Practice Guideline, Review, Therapeutics, Therapy
PMID: 24262386

Cryotherapy

Full immersion

Int J Sports Med. 2014 Jan;35(1):35-40. doi: 10.1055/s-0033-1343410. Epub 2013 Jun 18.

Effects of whole body cryotherapy and cold water immersion on knee skin temperature.

Costello JT1, Donnelly AE2, Karki A3, Selfe J4.
Author information

Abstract

This study sought to a) compare and contrast the effect of 2 commonly used cryotherapy treatments, 4 min of -110°C whole body cryotherapy and 8°C cold water immersion, on knee skin temperature and b) establish whether either protocol was capable of achieving a skin temperature (<13°C) believed to be required for analgesic purposes. After ethics committee approval and written informed consent was obtained, 10 healthy males (26.5±4.9 yr, 183.5±6.0 cm, 90.7±19.9 kg, 26.8±5.0 kg/m2, 23.0±9.3% body fat; mean±SD) participated in this randomised controlled crossover study. Skin temperature around the patellar region was assessed in both knees via non-contact, infrared thermal imaging and recorded pre-, immediately post-treatment and every 10 min thereafter for 60 min. Compared to baseline, average, minimum and maximum skin temperatures were significantly reduced ($p<0.001$) immediately post-treatment and at 10, 20, 30, 40, 50 and 60 min after both cooling modalities. Average and minimum skin temperatures were lower ($p<0.05$) immediately after whole body cryotherapy (19.0±0.9°C) compared to cold water immersion (20.5±0.6°C). However, from 10 to 60 min post, the average, minimum and maximum skin temperatures were lower ($p<0.05$) following the cold water treatment. Finally, neither protocol achieved a skin temperature believed to be required to elicit an analgesic effect.

PMID: 23780900

Muscles

Hamstrings

Br J Sports Med. 2013 Nov 19. doi: 10.1136/bjsports-2013-092450. [Epub ahead of print]

MRI observations at return to play of clinically recovered hamstring injuries.

Reurink G, Goudswaard GJ, Tol JL, Almusa E, Moen MH, Weir A, Verhaar JA, Hamilton B, Maas M.

Author information

- Department of Orthopaedics, Erasmus Medical Centre, Rotterdam, The Netherlands.

Abstract

BACKGROUND: Previous studies have shown that **MRI** of fresh **hamstring injuries** have diagnostic and prognostic value. The clinical relevance of **MRI** at **return** to **play** (RTP) has not been clarified yet. The aim of this study is to describe **MRI** findings of **clinically recovered hamstring injuries** in amateur, elite and professional athletes that were cleared for RTP.

METHODS: We obtained **MRI** of 53 consecutive athletes with **hamstring injuries** within 5 days of injury and within 3 days of RTP. We assessed the following parameters: injured muscle, grading of injury, presence and extent of intramuscular signal abnormality. We recorded reinjuries within 2 months of RTP.

RESULTS: MRIs of the initial injury showed 27 (51%) grade 1 and 26 (49%) grade 2 **injuries**. Median time to RTP was 28 days (range 12-76). On **MRI** at RTP 47 athletes (89%) had intramuscular increased signal intensity on fluid-sensitive sequences with a mean longitudinal length of 77 mm (±53) and a median cross-sectional area of 8% (range 0-90%) of the total muscle area. In 22 athletes (42%) there was abnormal intramuscular low-signal intensity. We recorded five reinjuries.

CONCLUSIONS: 89% of the **clinically recovered hamstring injuries** showed intramuscular increased signal intensity on fluid-sensitive sequences on **MRI**. Normalisation of this increased signal intensity seems not required for a successful RTP. Low-signal intensity suggestive of newly developed fibrous tissues is observed in one-third of the **clinically recovered hamstring injuries** on **MRI** at RTP, but its clinical relevance and possible association with increased reinjury risk has to be determined.

BET

Cognitive TA contraction

Spine (Phila Pa 1976). 2014 Jan 15;39(2):E89-96. doi: 10.1097/BRS.0000000000000091.

Effect of Recurrent Low Back Pain History on Volitional Pre-emptive Abdominal Activation During a Loaded Functional Reach Activity.

Nagar VR, Hooper TL, Dedrick GS, Brismée JM, Sizer PS Jr.
Author information

Abstract

STUDY DESIGN:
A 2 (group) × 2 (abdominal contraction) × 2 (reach activity) crossover mixed design with repeated measures for contraction and activity examined the effects of a loaded (4.6 kg) forward-reach activity and abdominal drawing-in maneuver (ADIM) on transversus abdominis (TrA) contraction in subjects with nonspecific low back pain (NSLBP) history versus controls.

OBJECTIVE:
We measured TrA contraction during a loaded forward-reach activity while using the ADIM and examined if a NSLBP history affects TrA activity.

SUMMARY OF BACKGROUND DATA:
The ADIM supports trunk stability during function. Clinicians incorporate ADIM during patients' functional tasks. Pain-free individuals can sustain ADIM during function, such as forward-reach. However, this has not been tested in those with a NSLBP history.

METHODS:
Eighteen normal subjects and 18 subjects with a history of NSLBP participated. A blinded investigator recorded M-mode ultrasound imaging measurements of TrA thickness (mm) during 4 conditions as follows: (1) quiet standing without ADIM; (2) quiet standing with ADIM; (3) loaded forward-reach without ADIM; and (4) loaded forward-reach with ADIM.

RESULTS:
A mixed analysis of variance demonstrated a significant main effect for group ($F [1, 34] = 5.404$, $P = 0.026$;), where TrA thickness was greater for NSLBP history (7.41 + 2.34 mm) versus controls (5.9 + 2.46 mm). A significant main effect was observed for abdominal contraction ($F [1, 34] = 49.57$, $P < 0.0001$;), where TrA thickness was greater during ADIM (7.47 + 2.7 mm) versus without ADIM (5.84, 1.92 m). A significant main effect was observed for forward-reach activity ($F [1, 34] = 12.79$, $P = 0.001$;), where TrA thickness was greater during a loaded forward-reach (7.04 + 2.6 mm) versus quiet standing (6.2 + 2.4 mm). There were no significant interactions.

CONCLUSION:
Individuals can use a volitional pre-emptive ADIM for trunk protection during loaded forward-reach, potentially reducing injury risk. A NSLBP history increases TrA activation during ADIM, suggesting an enhanced protective role. Level of Evidence: 2.

PMID: 24153166

Exercise

Exercise and adipose tissue

PLoS Genet. 2013 Jun;9(6):e1003572. doi: 10.1371/journal.pgen.1003572. Epub 2013 Jun 27.

A six months exercise intervention influences the genome-wide DNA methylation pattern in human adipose tissue.

Rönn T, Volkov P, Davegårdh C, Dayeh T, Hall E, Olsson AH, Nilsson E, Tornberg A, Dekker Nitert M, Eriksson KF, Jones HA, Groop L, Ling C.

Author information

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Abstract

Epigenetic mechanisms are implicated in gene regulation and the development of different diseases. The epigenome differs between cell types and has until now only been characterized for a few **human** tissues. Environmental factors potentially alter the epigenome. Here we describe the **genome-wide pattern** of **DNA methylation** in **human adipose tissue** from 23 healthy men, with a previous low level of physical activity, before and after a **six months exercise intervention**. We also investigate the differences in **adipose tissue DNA methylation** between 31 individuals with or without a family history of type 2 diabetes. **DNA methylation** was analyzed using Infinium HumanMethylation450 BeadChip, an array containing 485,577 probes covering 99% RefSeq genes. Global **DNA methylation** changed and 17,975 individual CpG sites in 7,663 unique genes showed altered levels of **DNA methylation** after the **exercise intervention** ($q<0.05$). Differential mRNA expression was present in 1/3 of gene regions with altered **DNA methylation**, including RALBP1, HDAC4 and NCOR2 ($q<0.05$). Using a luciferase assay, we could show that increased **DNA methylation** in vitro of the RALBP1 promoter suppressed the transcriptional activity ($p=0.03$). Moreover, 18 obesity and 21 type 2 diabetes candidate genes had CpG sites with differences in **adipose tissue DNA methylation** in response to **exercise** ($q<0.05$), including TCF7L2 (6 CpG sites) and KCNQ1 (10 CpG sites).

A simultaneous change in mRNA expression was seen for 6 of those genes. To understand if genes that exhibit differential **DNA methylation** and mRNA expression in **human adipose tissue** in vivo affect adipocyte metabolism, we silenced Hdac4 and Ncor2 respectively in 3T3-L1 adipocytes, which resulted in increased lipogenesis both in the basal and insulin stimulated state. In conclusion, **exercise** induces **genome-wide** changes in **DNA methylation** in **human adipose tissue**, potentially affecting adipocyte metabolism.

Pilates mats vs equipment

Phys Ther. 2014 Jan 16.

Effectiveness of Mat Pilates or Equipment-Based Pilates Exercises in Patients With Chronic Nonspecific Low Back Pain: A Randomized Controlled Trial.

da Luz MA, Costa LO, Fuhro FF, Manzoni AC, Oliveira NT, Cabral CM.
Author information

Abstract

BACKGROUND:
The Pilates method has been widely used to treat chronic low back pain. Pilates exercises can be performed in two ways: by using specific equipment or without it (also known as mat Pilates), however there are no studies that compared the effectiveness of mat Pilates to equipment-based Pilates.

OBJECTIVE:
To compare the effectiveness of mat Pilates to equipment-based Pilates in patients with chronic non-specific low back pain.

DESIGN:
Two-arm randomized controlled trial with a blinded assessor.

SETTING:
Private physical therapy clinic in Brazil.

PATIENTS:
Eighty-six patients with chronic non-specific low back pain.

INTERVENTION:
The patients were randomly allocated into two groups: mat Pilates group (n=43) and equipment-based group (n=43). The patients of both groups attended 12 Pilates sessions over a period of 6 weeks.

MEASUREMENTS:
The primary outcomes were pain intensity and disability. The secondary outcomes were global perceived effect, patient's specific disability, and kinesiophobia. A blinded assessor evaluated the outcomes at baseline and 6 weeks and 6 months after randomization.

RESULTS:
After 6 months, there was a statistically significant difference for disability (mean difference = 3.0 points, 95% CI = 0.6 to 5.4), specific disability (mean difference = -1.1 points, 95% CI = -2.0 to -0.1) and kinesiophobia (mean difference = 4.9 points, 95% CI = 1.6 to 8.2) in favor of equipment-based Pilates. No differences were found for the remaining outcomes.

CONCLUSIONS:
Equipment-based Pilates was superior to mat Pilates in the 6 months follow-up for the outcomes disability and kinesiophobia. These benefits were not observed for pain intensity and global perceived effect in patients with chronic non-specific low back pain.

PMID: 24435105

Foam Roll / Stretching

Foam rolling and static stretching on passive hip flexion range of motion
Journal of Sport Rehabilitation, 01/22/2014 **Evidence Based Medicine**
Mohr AR, et al. –

ABSTRACT ***Context:*** Many athletes report that foam rollers help release tension in their muscles thus resulting in greater range of motion (ROM) when used prior to stretching. To date, no investigators have examined foam rollers and static stretching.

Objective: To determine if foam rolling prior to static stretching produces a significant change in passive hip flexion range of motion.

Design: Controlled laboratory study. ***Setting:*** Research laboratory. ***Patients or Other Participants:*** Forty subjects with less than 90°of passive hip flexion ROM and no lower extremity injury 6 months prior to data collection participated.

Interventions: During each of 6 sessions, subjects passive hip flexion range of motion was measured prior to and immediately following: static stretching, foam rolling and static stretching, foam rolling, or nothing (control). To minimize accessory movement of the hip and contralateral leg, subjects lay supine with a one strap placed across their hip and another strap located over the uninvolved leg just superior to the patella. A bubble inclinometer was then aligned on the thigh of the involved leg where subjects then performed hip flexion.

Main Outcome Measures: Change in passive hip flexion ROM from the premeasure on day 1 to the post measure on day 6.

Results: There was a significant change in passive hip flexion ROM regardless of treatment ($F_{3,17} = 8.06$; $P = .001$). Subjects receiving foam roll and static stretch had a greater change in passive hip flexion ROM compared to the static stretch ($P=.04$), foam rolling ($P=.006$), and control ($P=.001$) groups.

Conclusions: Our results support the use of a foam roller in combination with a static stretching protocol. If time allows and maximal gains in hip flexion ROM are desired, foam rolling the hamstring muscle group prior to static stretching would be appropriate in non-injured patients who have less than 90° of hamstring ROM.

Key Words: Self-Myofascial Release, Flexibility, Stretching

Foam Rolling

Med Sci Sports Exerc. 2014 Jan;46(1):131-42. doi: 10.1249/MSS.0b013e3182a123db.
Foam rolling as a recovery tool after an intense bout of physical activity.

Macdonald GZ, Button DC, Drinkwater EJ, Behm DG.
Author information

Abstract

PURPOSE:
The objective of this study is to understand the effectiveness of **foam rolling** (FR) as a **recovery tool after** exercise-induced muscle damage, analyzing thigh girth, muscle soreness, range of motion (ROM), evoked and voluntary contractile properties, vertical jump, perceived pain while FR, and force placed on the **foam** roller.

METHODS:
Twenty male subjects (≥3 yr of strength training experience) were randomly assigned into the control (n = 10) or FR (n = 10) group. All the subjects followed the same testing protocol. The subjects participated in five testing sessions: 1) orientation and one-repetition maximum back squat, 2) pretest measurements, 10 × 10 squat protocol, and POST-0 (posttest 0) measurements, along with measurements at 3) POST-24, 4) POST-48, and 5) POST-72. The only between-group difference was that the FR group performed a 20-min FR exercise protocol at the end of each testing session (POST-0, POST-24, and POST-48).

RESULTS:
FR substantially reduced muscle soreness at all time points while substantially improving ROM. FR negatively affected evoked contractile properties with the exception of half relaxation time and electromechanical delay (EMD), with FR substantially improving EMD. Voluntary contractile properties showed no substantial between-group differences for all measurements besides voluntary muscle activation and vertical jump, with FR substantially improving muscle activation at all time points and vertical jump at POST-48. When performing the five FR exercises, measurements of the subjects' force placed on the **foam** roller and perceived pain while FR ranged between 26 and 46 kg (32%-55% body weight) and 2.5 and 7.5 points, respectively.

CONCLUSION:
The most important findings of the present study were that FR was beneficial in attenuating muscle soreness while improving vertical jump height, muscle activation, and passive and dynamic ROM in comparison with control. FR negatively affected several evoked contractile properties of the muscle, except for half relaxation time and EMD, indicating that FR benefits are primarily accrued through neural responses and connective tissue.

Endurance

Med Sci Sports Exerc. 2014 Jan 1.

Central and Peripheral Fatigability in Boys and Men during Maximal Contraction.

Hatzikotoulas K, Patikas D, Ratel S, Bass E, Kotzamanidis C.
Author information

Abstract

PURPOSE:
The purpose of this study was to examine central and peripheral factors of fatigability that could explain the differences in fatigability between adults and prepubertal boys after maximal sustained isometric contraction.

METHODS:
Eleven untrained adult men and ten prepubescent boys volunteered to participate in this study. The level of voluntary activation was assessed before and after fatigue by means of the twitch interpolation technique as well as peak twitch torque, maximum rate of torque development and maximum M-wave (Mmax) area of the soleus and medial gastrocnemius. The fatigue-inducing protocol consisted of a sustained maximal voluntary contraction (MVC) of the ankle's plantar flexor at 100% of MVC until the task could no longer be sustained at 50% of MVC.

RESULTS:
During the fatigue-inducing protocol, boys were fatigued less, showing longer endurance limit and delayed torque and agonist EMG decrease. After fatigue the level of activation decreased to a similar extent in both groups, and boys were less affected regarding their peak twitch torque and rate of torque development, whereas no differentiation between the groups was observed regarding the decrease in Mmax area of the examined muscles.

CONCLUSION:
The results obtained provide evidence that the greater fatigability resistance in prepubertal children during sustained maximal contractions is mainly explained by peripheral rather than central factors.

PMID: 24389527

Plyometric training lower extremity

Clin J Sport Med. 2014 Jan;24(1):44-50. doi: 10.1097/01.jsm.0000432852.00391.de.

Effect of plyometric training on lower limb biomechanics in females.

Baldon Rde M, Moreira Lobato DF, Yoshimatsu AP, Dos Santos AF, Francisco AL, Pereira Santiago PR, Serrão FV.
Author information

Abstract

OBJECTIVE:
To verify the effects of plyometric training on lower limb kinematics, eccentric hip and knee torques, and functional performance.

DESIGN:
Cohort study.

SETTING:
Research laboratory.

PARTICIPANTS:
Thirty-six females were divided into a training group (TG; n = 18) that carried out the plyometric training for 8 weeks, and a control group (CG; n = 18) that carried out no physical training.

INTERVENTIONS:
Twenty-four plyometric training sessions during approximately 8 weeks with 3 sessions per week on alternate days.

MAIN OUTCOMES MEASURES:
Lower limb kinematics (maximum excursion of hip adduction, hip medial rotation, and knee abduction during the single leg squat), eccentric hip (abductor, adductor, medial, and lateral rotator) isokinetic peak torques and knee (flexor and extensor) isokinetic peak torques, and functional performance (triple hop test and the 6-m timed hop test).

RESULTS:
After 8 weeks, only the TG significantly reduced the values for the maximum excursion of knee abduction ($P = 0.01$) and hip adduction ($P < 0.001$). Similarly, only the TG significantly increased the eccentric hip abductor ($P < 0.001$) and adductor ($P = 0.01$) torques. Finally, only the TG significantly increased the values in the triple hop test ($P < 0.001$) and significantly decreased the values in the 6-m timed hop test ($P < 0.001$) after intervention.

CONCLUSION:
Plyometric training alters lower limb kinematics and increases eccentric hip torque and functional performance, suggesting the incorporation of these exercises in preventive programs for ACL injuries.

PMID: 24100464

T/A training and LBP

J Pain. 2013 Oct 31. pii: S1526-5900(13)01317-5. doi: 10.1016/j.jpain.2013.10.008.

Do changes in transversus abdominis and lumbar multifidus during conservative treatment explain changes in clinical outcomes related to non-specific low back pain? A systematic review.

Wong AY, Parent EC, Funabashi M, Kawchuk GN.

Author information Department of Physical **Therapy**, University of Alberta, Edmonton, Alberta, Canada.

Abstract

Previous research describes an inconsistent relation between temporal **changes** in **transversus abdominis** or **lumbar multifidus** and temporal **changes** in **clinical outcomes**. Unfortunately, a relevant **systematic review** is unavailable. As a result, this **systematic review** was designed to summarize evidence regarding the association between temporal **changes** in muscle morphometry and activity in response to **treatment** and temporal **changes** in **clinical outcomes**. Candidate publications were identified from six electronic databases. Fifteen articles were included after scrutinization by two reviewers using the predetermined selection criteria. The methodological quality of these articles was appraised using a standard tool. These methods revealed strong evidence that temporal alterations in **transversus abdominis** thickness change during contraction (as measured by B-mode or M-mode ultrasound) or feedforward activation of **transversus abdominis** (assessed via electromyography, tissue Doppler imaging or M-mode ultrasound) were unrelated to temporal **changes** in LBP/LBP-**related** disability. There was limited evidence that temporal **changes** in **transversus abdominis** lateral sliding or **lumbar multifidus** endurance were unrelated to temporal **changes** in LBP intensity. Conflicting evidence was found for the relation between temporal **changes** in **lumbar multifidus** morphometry and temporal **changes** in LBP/LBP-**related** disability. This **review** highlights that temporal **changes** in **transversus abdominis** features tend to be unrelated to the corresponding LBP/LBP-**related** disability improvements while the relation between **multifidus changes** and **clinical** improvements remains uncertain.

PERSPECTIVE:

This **systematic review** highlighted that **changes** in morphometry or activation of **transversus abdominis** following **conservative** treatments tend not to be associated with the corresponding **changes** in **clinical outcomes**. The relation between post-**treatment changes** in characteristics of **lumbar multifidus** and **clinical** improvements remains uncertain.

C spine strengthening vs. stretching

Research article

Evaluation of pain and function after two home exercise programs in a clinical trial on women with chronic neck pain - with special emphasizes on completers and responders

Linn Karlsson, **Esa-Pekka Takala**, **Björn Gerdle** and **Britt Larsson**

BMC Musculoskeletal Disorders 2014, **15**:6 doi:10.1186/1471-2474-15-6

Background

Different types of exercises can help manage chronic neck pain. Supervised exercise interventions are widely used, but these protocols require substantial resources. The aim of this trial, which focused on adherence, was to evaluate two home exercise interventions.

Methods

This parallel group randomized controlled trial included 57 women randomly allocated into two groups - a strength training group (STRENGTH, 34 subjects) and a stretching group (STRETCH, 23 subjects). The interventions focused on the neck and shoulder muscles and lasted for 12 months. The STRENGTH group performed weight training and ended each session with stretching exercises. These stretching exercises constituted the entirety of the STRETCH group's training session. Both groups were instructed to exercise three times per week. All the participants kept an exercise diary. In addition, all participants were offered support via phone and e-mail. The primary outcomes were pain intensity and function. The trial included a four- to six-month and a twelve-month follow-up. A completer in this study exercised at least 1,5 times per week during eight unbroken weeks. A responder in this study reported clinically significant improvements on pain and function. The statistical analyses used the Mann Whitney U-test, Wilcoxon signed-rank test, and X2 test.

Results

At four- to six-months, the numbers of completers were 19 in the STRENGTH group and 17 in the STRETCH group. At twelve months, the corresponding numbers were 11 (STRENGTH) and 10 (STRETCH). At four- to six-months, the proportions of subjects reporting clinically important changes (STRENGTH and STRETCH) were for neck pain: 47% and 41%, shoulder pain: 47% and 47%, function: 37% and 29%. At twelve months, the corresponding numbers were for neck pain: 45% and 40%, shoulder pain: 55% and 50%, function: 55% and 20%.

Conclusions

No differences in the two primary outcomes between the two interventions were found, a finding that may be due to the insufficient statistical power of the study. Both interventions based on home exercises improved the two primary outcomes, but the adherences were relatively low. Future studies should investigate ways to improve adherence to home exercise treatments. Trial registration: ClinicalTrials.gov Id: NCT01876680

Posture

Ligaments

J Electromyogr Kinesiol. 2002 Jun;12(3):167-76.

Spinal and supraspinal effects of activity in ligament afferents.

Sjölander P, Johansson H, Djupsjöbacka M.
Author information

Abstract

In this paper available knowledge on effects from joint and ligament afferents on spinal neurones and pathways are briefly reviewed, and possible functional implications discussed.

Ligament afferents may contribute to joint stability, muscle coordination and proprioception through direct polysynaptic reflex effects onto ascending pathways and skeletomotoneurones, and/or indirectly via reflex actions on the gamma-muscle spindle system. Theoretical and experimental evidence indicate that ligament afferents, together with afferents from other joint structures, muscles and the skin, provide the CNS with information on movements and posture through ensemble coding mechanisms, rather than via modality specific private pathways. The existence and functional relevance of ligamentomuscular protective reflexes, that are triggered when the ligament is threatened by potentially harmful loads, has been seriously questioned. It seems more likely that peripheral sensory inputs from ligament afferents participate in a continuous control of the muscle activity through feedforward, or preprogramming, mechanisms.

In line with these ideas it has been suggested that ligament mechanoreceptors have an important role in muscle coordination and in the reflex regulation of the functional joint stability, by contributing to the preprogramming of the muscle stiffness through reflex modulation of the gamma-muscle spindle system.

PMID: 12086810

Fatigue of ankle and postural control

Exp Brain Res. 2013 Dec 25.

The influence of age and surface compliance on changes in postural control and attention due to ankle neuromuscular fatigue.

Bisson EJ, Lajoie Y, Bilodeau M.

Author information

Abstract

The reduction in the quality and integration of sensory information with aging could increase the alterations in postural control associated with muscle fatigue observed in younger adults. This study aimed to compare changes in postural control and attentional demands due to ankle muscle fatigue, with intact and reduced proprioceptive information at the ankle, between young and older adults. Eleven young (24 ± 4 years) and 13 older (65 ± 4 years) men stood quietly on a force platform (blindfolded) under four experimental conditions (combinations of firm (FS)/compliant (CS) surfaces and single/dual tasks), before and immediately after a fatiguing exercise. The fatiguing exercise, performed on a dynamometer, consisted of maintaining an isometric contraction of the plantarflexors at 50 % of maximum until exhaustion. Both COP sway area and COP sway velocity were greater on the CS compared to FS and increased with fatigue for both groups in all conditions. COP sway area showed a greater increase with fatigue in older adults when standing on the CS. Reaction time (secondary task) increased significantly after fatigue, but only for older adults when standing on the CS. The effects of fatigue on postural control are more important when proprioceptive information at the ankle is altered. In particular, older adults had more difficulty and may have needed more attention to stand quietly, compared with young adults.

PMID: 24368599

Scoliosis

Prevalence

Spine (Phila Pa 1976). 2014 Jan 15;39(2):149-52. doi: 10.1097/BRS.0000000000000095.

Thoracic scoliosis prevalence in patients 50 years or older and its relationship with age, sex, and thoracic kyphosis.

Urrutia J, Zamora T, Klaber I.
Author information

Abstract

STUDY DESIGN:
Cross-sectional study.

OBJECTIVE:
To determine the prevalence of thoracic scoliosis in patients aged 50 years or older and to investigate the association of adult thoracic scoliosis with age, sex, and thoracic sagittal curve.

SUMMARY OF BACKGROUND DATA:
The prevalence of adult thoracic scoliosis has not been clearly determined. In addition, limited data are available on the correlation of adult thoracic scoliosis to age, sex, and thoracic kyphosis.

METHODS:
We studied 760 patients aged 50 years or older (380 males and 380 females) who were evaluated using standing chest plain radiographs. The thoracic curvatures in the coronal and sagittal planes were measured using the Cobb method. Scoliosis was defined by the presence of a coronal curvature 10° or more. We performed a correlation analysis of the coronal curve with age and sagittal curve; in addition, a linear regression analysis was carried out to evaluate age, sex, and sagittal curve as independent predictors of the coronal Cobb angle of the thoracic spine.

RESULTS:
The prevalence of thoracic scoliosis was 24.2% (184 cases); 160 patients (21.1%) had curves 10° or more but less than 20°; 20 patients (2.6%) had curves 20° or more but less than 30°; and 4 patients (0.5%) had curves 30° or more. Females exhibited a higher prevalence of scoliosis (28.9%) than did males (19.4%), $P < 0.01$. The older patients exhibited increased scoliosis, but no differences were observed in thoracic kyphosis with increasing scoliosis. Age and sex were independent predictors of the coronal Cobb angle; however, the sagittal angle was not.

CONCLUSION:
We found a 24.2% prevalence of thoracic scoliosis in patients 50 years or older; most curves were less than 20°. Thoracic scoliosis was more common in females and in older patients. Level of Evidence: 3.

PMID: 24153170

Sagittal plan assessment

Spine J. 2014 Feb 1;14(2):282-90. doi: 10.1016/j.spinee.2013.08.059. Epub 2013 Nov 12.

Differences in early sagittal plane alignment between thoracic and lumbar adolescent idiopathic scoliosis.

Schlösser TP1, Shah SA2, Reichard SJ2, Rogers K2, Vincken KL3, Castelein RM4.

BACKGROUND CONTEXT: It has previously been shown that rotational stability of spinal segments is reduced by posteriorly directed shear loads that are the result of gravity and muscle tone. Posterior shear loads act on those segments of the spine that are posteriorly inclined, as determined by each individual's inherited sagittal spinal profile. Accordingly, it can be inferred that certain sagittal spinal profiles are more prone to develop a rotational deformity that may lead to idiopathic scoliosis; and lumbar scoliosis, on one end of the spectrum, develops from a different sagittal spinal profile than thoracic scoliosis on the other end.
PURPOSE: To examine the role of sagittal spinopelvic alignment in the etiopathogenesis of different types of idiopathic scoliosis.
STUDY DESIGN/SETTING: Multicenter retrospective analysis of lateral radiographs of patients with small thoracic and lumbar adolescent idiopathic scoliotic curves.
PATIENTS SAMPLE: We included 192 adolescent idiopathic scoliosis patients with either a thoracic (n=128) or lumbar (n=64) structural curve with a Cobb angle of less than 20° were studied. Children with other spinal pathology or with more severe idiopathic scoliosis were excluded, because this disturbs their original sagittal profile. Subjects who underwent scoliosis screening and had a normal spine were included in the control cohort (n=95).
OUTCOME MEASURES: Thoracic kyphosis, lumbar lordosis, T9 sagittal offset, C7 and T4 sagittal plumb lines, pelvic incidence, pelvic tilt, and sacral slope, as well as parameters describing orientation in space of each individual vertebra between C7 and L5 and length of the posteriorly inclined segment.
METHODS: On standardized lateral radiographs of the spine, a systematic, semi-automatic measurement of the different sagittal spinopelvic parameters was performed for each subject using in-house developed computer software.
RESULTS: Early thoracic scoliosis showed a significantly different sagittal plane from lumbar scoliosis. Furthermore, both scoliotic curve patterns were different from controls, but in a different sense. Thoracic kyphosis was significantly decreased in thoracic scoliosis compared with both lumbar scoliosis patients and controls. For thoracic scoliosis, a significantly longer posteriorly inclined segment, and steeper posterior inclination of C7-T8 was observed compared with both lumbar scoliosis and controls. In lumbar scoliosis, the posteriorly inclined segment was shorter and located lower in the spine, and T12-L4 was more posteriorly inclined than in the thoracic group. The lumbar scoliosis cohort had a posteriorly inclined segment of the same length as controls, but T12-L2 showed steeper posterior inclination. Lumbar lordosis, pelvic incidence, pelvic tilt, and sacral slope, however, were similar for the two scoliotic subgroups as well as the controls.
CONCLUSIONS: This study demonstrates that even at an early stage in the condition, the sagittal profile of thoracic adolescent idiopathic scoliosis differs significantly from lumbar scoliosis, and both types of scoliosis differ from controls, but in different aspects. This supports the theory that differences in underlying sagittal profile play a role in the development of different types of idiopathic scoliosis.

Management classification system

Spine J. 2014 Feb 1;14(2):315-25. doi: 10.1016/j.spinee.2013.10.045. Epub 2013 Nov 12.

Assessment of skeletal maturity in scoliosis patients to determine clinical management: a new classification scheme using distal radius and ulna radiographs.

Luk KD1, Saw LB2, Grozman S2, Cheung KM2, Samartzis D2.
Author information

Abstract

BACKGROUND:
Assessment of skeletal maturity in patients with adolescent idiopathic scoliosis (AIS) is important to guide clinical management. Understanding growth peak and cessation is crucial to determine clinical observational intervals, timing to initiate or end bracing therapy, and when to instrument and fuse. The commonly used clinical or radiologic methods to assess skeletal maturity are still deficient in predicting the growth peak and cessation among adolescents, and bone age is too complicated to apply.

PURPOSE:
To address these concerns, we describe a new distal radius and ulna (DRU) classification scheme to assess skeletal maturity.

STUDY DESIGN:
A prospective study.

PATIENT SAMPLE:
One hundred fifty young, female AIS patients with hand x-rays and no previous history of spine surgery from a single institute were assessed.

OUTCOME MEASURES:
Radius and ulna plain radiographs, and various anthropomorphic parameters were assessed.

METHODS:
We identified various stages of radius and ulna epiphysis maturity, which were graded as R1-R11 for the radius and U1-U9 for the ulna. The bone age, development of sexual characteristics, standing height, sitting height, arm span, radius length, and tibia length were studied prospectively at each stage of these epiphysis changes.

RESULTS:
Standing height, sitting height, and arm span growth were at their peak during stages R7 (mean, 11.4 years old) and U5 (mean, 11.0 years old). The long bone growths also demonstrated a common peak at R7 and U5. Cessation of height and arm span growth was noted after stages R10 (mean, 15.6 years old) and U9 (mean, 17.3 years old).

CONCLUSIONS:
The new DRU classification is a practical and easy-to-use scheme that can provide skeletal maturation status. This classification scheme provides close relationship with adolescent growth spurt and cessation of growth. This classification may have a tremendous utility in improving clinical-decision making in the conservative and operative management of scoliosis patients.

KEYWORDS: Adolescent, Classification, Distal, Maturity, Radius, Scoliosis, Skeletal, Spine
PMID: 24239801

Somatometric measurements

J Spinal Disord Tech. 2014 Feb;27(1):E26-31. doi: 10.1097/BSD.0b013e31828af710.

A comparison of the somatometric measurements of adolescent males with and without idiopathic scoliosis.

Oh CH, Yoon SH, Park HC, Park CO, Kim SY.
Author information

Abstract

STUDY DESIGN:
Prospective study comparing the somatometric measurements of young males with normal spinal curves and with adolescent idiopathic scoliosis (AIS) with respect to the severity of AIS.

OBJECTIVE:
To assess the somatometric measurements of young males with normal spinal curves and with AIS using the conscription data.

SUMMARY OF BACKGROUND DATA:
The progression of AIS is closely correlated with longitudinal growth during puberty. Although abnormal growth in female AIS patients has been well investigated, the growth of male AIS patients has not been well reported.

METHODS:
During Korean conscription, 409 adolescent males with a normal spinal curvature and 420 adolescent males with AIS were enrolled. Those with AIS were grouped according to the severity of scoliosis using Cobb angles, according to the guidelines issued by the Korean military directorate. Group somatometric measurements, such as body height, corrected body height (corrected using Bjure's equation), body weight, and body mass index (BMI) were compared.

RESULTS:
Uncorrected heights were insignificantly different (P=0.234), but corrected heights, body weights, and BMIs were all significantly different between the normal and all AIS groups (P<0.001) (in AIS, corrected height was greater and body weight and BMIs corrected or uncorrected for height were lower). Cobb angles were not related to corrected body height or BMI, but was related to weight. Body weight was significantly less in the severe AIS group (Cobb angle >40 degrees) than in the mild or moderate AIS group (P<0.042).

CONCLUSIONS:
In Korean male AIS patients, significantly different somatometric results were observed: namely, a greater corrected height and a lower body weight and BMIs corrected or uncorrected for height. Furthermore, body weight was significantly lower in the severe group than in the moderate group. This study shows that abnormal growth is observed in male AIS patients and that body weight is closely correlated with AIS severity.

PMID: 23511644

Thoracic cage surgery/scoliosis

Prognostic risk factors for the development of scoliosis after chest wall resection for malignant tumors in children

The Journal of Bone & Joint Surgery, 01/16/2014 **Evidence Based Medicine**
Scalabre A, et a

Background:
Surgical resection of a malignant tumor of the chest wall in children may result in the development of progressive scoliosis. The aim of this study was to identify the risk factors associated with scoliosis following resection of a tumor of the chest wall and to evaluate the prevalence and characteristics of the scoliosis.
Methods:
Forty children who underwent resection of a malignant tumor of the chest wall from 1984 to 2005 were included in a multicenter, retrospective cohort study. The mean age of the patients at the time of surgery was 9.8 years (range, 0.2 to nineteen years). Resections were classified with the use of the following scheme: the number of resected ribs was noted in Roman numerals, and the level of the resection was identified by dividing the thorax into three sectors (A [anterior], B [lateral], and C [posterior]) in the horizontal plane. One to five ribs (mean, 2.3 ribs) were resected. Patients with scoliosis were compared with patients who did not have scoliosis through the use of univariate and multivariate analyses. The mean duration of follow-up was 8.5 years (range, three to twenty-three years).
Results:
Patients who had a tumor resection during a rapid-growth period (patient age of less than six years or between twelve and fifteen years) had a 5.8 times higher risk of scoliosis. The resection of three or more ribs in the posterior sector (C) was the primary risk factor for scoliosis, with an odds ratio of 18.9. Seventeen (43%) of the children developed scoliosis, which was convex toward the resection side without vertebral rotation in all of them.
Conclusions:
The risk of scoliosis following the resection of a primary malignant tumor of the chest wall in children was shown to be higher when resection was performed during a rapid-growth period and when the resection involved three or more ribs in the posterior sector.
Level of Evidence:
Prognostic Level III. See Instructions for Authors for a complete description of levels of evidence.
Peer Review
This article was reviewed by the Editor-in-Chief and one Deputy Editor, and it underwent blinded review by two or more outside experts. It was also reviewed by an expert in methodology and statistics. The Deputy Editor reviewed each revision of the article, and it underwent a final review by the Editor-in-Chief prior to publication. Final corrections and clarifications occurred during one or more exchanges between the author(s) and copyeditors.

Impact

Spine (Phila Pa 1976). 2014 Jan 15;39(2):140-8. doi: 10.1097/BRS.0000000000000081.

Low body mass index in adolescent idiopathic scoliosis: relationship with pre- and postsurgical factors.

Tarrant RC, Lynch S, Sheeran P, O'loughlin PF, Harrington M, Moore DP, Kiely PJ.
Author information

Abstract

STUDY DESIGN:
Retrospective cohort study.

OBJECTIVE:
To determine the association between low preoperative body mass index (BMI) and outcome of spinal fusion in adolescent idiopathic scoliosis (AIS).

SUMMARY OF BACKGROUND DATA:
Several studies report a lower weight and BMI in untreated subjects with AIS than nonscoliotic age-matched controls. However, very little is known about the clinical impact of low BMI on pre- or postsurgical parameters in this patient group.

METHODS:
Seventy-seven eligible patients with AIS who underwent 1-stage posterior spinal fusion and correction at 2 tertiary centers (January 2010-April 2012) were included. Preoperative weight, corrected height, and BMI values were converted to z scores using the British 1990 growth reference data. Relationships between anthropometric indices and comorbidities, laboratory blood data, radiographical outcomes, length of hospital stay, and perioperative complications were examined, and the independent factors associated with low BMI (z score < -1) evaluated using binary logistic regression analysis.

RESULTS:
In this AIS cohort (mean age, 15.04 yr; n = 72 females), 21 subjects (27.3%) had a low preoperative BMI; of these, 5 cases (6.5%) were considered severely thin. Lower BMI and weight z scores correlated with a greater percent correction of thoracic curves (rs = -0.287 and rs = -0.257, respectively, $P < 0.05$). In both the univariate and multivariate regression analysis, low BMI was significantly associated with preoperative asthma incidence (adjusted odds ratio 5.33, $P = 0.023$) and prolonged prothrombin time (adjusted odds ratio 4.53, $P = 0.027$), in addition to postoperative ileus development (adjusted odds ratio 11.96, $P = 0.019$). Preoperative Cobb angle, estimated intraoperative blood loss and length of hospital stay did not significantly differ between the BMI groups.

CONCLUSION:
Significantly increased preoperative coagulation abnormality and asthma incidence as well as a greater percent correction of thoracic curves were associated with low BMI in this series. It was also found that postoperative ileus was independently associated with low BMI.Level of Evidence: 3.

PMID: 24153169

ATHLETICS

Skier's efficiency

Sports Med. 2013 Dec 28.

Biomechanical Factors Influencing the Performance of Elite Alpine Ski Racers.Hébert-Losier K, Supej M, Holmberg HC.

BACKGROUND: Alpine ski racing is a popular international winter sport that is complex and challenging from physical, technical, and tactical perspectives. Despite the vast amount of scientific literature focusing on this sport, including topical reviews on physiology, ski-snow friction, and injuries, no review has yet addressed the biomechanics of elite alpine ski racers and which factors influence performance. In World Cup events, winning margins are often mere fractions of a second and biomechanics may well be a determining factor in podium place finishes.
METHODS: Four electronic databases were searched using relevant medical subject headings and key words, with an additional manual search of reference lists, relevant journals, and key authors in the field. Articles were included if they addressed human biomechanics, elite alpine skiing, and performance. Only original research articles published in peer-reviewed journals and in the English language were reviewed. Articles that focused on skiing disciplines other than the four of primary interest were excluded (e.g., mogul, ski-cross and freestyle skiing). The articles subsequently included for review were quality assessed using a modified version of a validated quality assessment checklist. Data on the study population, design, location, and findings relating biomechanics to performance in alpine ski racers were extracted from each article using a standard data extraction form.
RESULTS:A total of 12 articles met the inclusion criteria, were reviewed, and scored an average of 69 ± 13 % (range 40-89 %) upon quality assessment. Five of the studies focused on giant slalom, four on slalom, and three on downhill disciplines, although these latter three articles were also relevant to super-G events. Investigations on speed skiing (i.e., downhill and super-G) primarily examined the effect of aerodynamic drag on performance, whereas the others examined turn characteristics, energetic principles, technical and tactical skills, and individual traits of high-performing skiers. The range of biomechanical factors reported to influence performance included energy dissipation and conservation, aerodynamic drag and frictional forces, ground reaction force, turn radius, and trajectory of the skis and/or centre of mass. The biomechanical differences between turn techniques, inter-dependency of turns, and abilities of individuals were also identified as influential factors in skiing performance. In the case of slalom and giant slalom events, performance could be enhanced by steering the skis in such a manner to reduce the ski-snow friction and thereby energy dissipated. This was accomplished by earlier initiation of turns, longer path length and trajectory, earlier and smoother application of ground reaction forces, and carving (rather than skidding). During speed skiing, minimizing the exposed frontal area and positioning the arms close to the body were shown to reduce the energy loss due to aerodynamic drag and thereby decrease run times. In actual races, a consistently good performance (i.e., fast time) on different sections of the course, terrains, and snow conditions was a characteristic feature of winners during technical events because these skiers could maximize gains from their individual strengths and minimize losses from their respective weaknesses.
CONCLUSIONS: Effective alpine skiing performance involves the efficient use of potential energy, the ability to minimize ski-snow friction and aerodynamic drag, maintain high velocities, and choose the optimal trajectory. Individual tactics and techniques should also be considered in both training and competition. To achieve better run times, consistency in performance across numerous sections and varied terrains should be emphasized over excellence in individual sections and specific conditions. PMID: 24374655

Female soccer players

Int J Sports Med. 2014 Feb;35(2):110-7. doi: 10.1055/s-0033-1345134. Epub 2013 Jul 18.

Motion Characteristics of Youth Women Soccer Matches: Female Athletes in Motion (FAiM) Study.

Vescovi JD.

Author information

Abstract

This study determined the locomotor characteristics for youth female soccer matches. 89 female soccer players (U-15-U-17) were assessed during a youth national championship or a talent identification camp using a Global Positioning System. Positional and age-group comparisons of locomotor characteristics were made for complete games, each half, differences between halves as well as sprint profiles using an ANCOVA adjusting for the differences in game or half durations, respectively. Midfielders covered greater distances (8 449±170 m) than defenders (7 779±114 m), mostly from more low- (2 553±99 m vs. 2 151±66 m) and moderate-speed running (1 389±78 m vs. 1 142±52 m). Forwards had more sprint distances (275±42 m), sprints (15±2) and greater maximum speed (26.7±0.6 km · h-1) than midfielders (131±24 m, 8±1, 24.7±0.4 km · h-1, respectively). There was a tendency for increased distances within most velocity bands, workrate and sprints with increasing age. There was a greater increase in walking and jogging between the first and second half for forwards than defenders and midfielders. Youth female soccer players covered 6 500-9 000 m during matches with positional distinctions that are comparable to elite-standard women. These data provide novel insight into the physical demands of female youth soccer and should be used to establish appropriate age-group and positional strategies for training and development.

PMID: 23868688

High altitude training

J Appl Physiol (1985). 1997 Jul;83(1):102-12.

"Living high-training low": effect of moderate-altitude acclimatization with low-altitude training on performance.

Levine BD, Stray-Gundersen J.
Author information

Abstract

The principal objective of this study was to test the hypothesis that **acclimatization** to **moderate altitude** (2,500 m) plus **training** at **low altitude** (1,250 m), "**living high-training low**," improves sea-level performance in well-trained runners more than an equivalent sea-level or altitude control. Thirty-nine competitive runners (27 men, 12 women) completed 1) a 2-wk lead-in phase, followed by 2) 4 wk of supervised **training** at sea level; and 3) 4 wk of field **training** camp randomized to three groups: "high-**low**" (n = 13), **living** at **moderate altitude** (2,500 m) and **training** at **low altitude** (1,250 m); "high-high" (n = 13), **living** and **training** at **moderate altitude** (2,500 m); or "**low-low**" (n = 13), **living** and **training** in a mountain environment at sea level (150 m). A 5,000-m time trial was the primary measure of performance; laboratory outcomes included maximal O2 uptake (VO2 max), anaerobic capacity (accumulated O2 deficit), maximal steady state (MSS; ventilatory threshold), running economy, velocity at VO2 max, and blood compartment volumes. Both altitude groups significantly increased VO2 max (5%) in direct proportion to an increase in red cell mass volume (9%; $r = 0.37$, $P < 0.05$), neither of which changed in the control. Five-kilometer time was improved by the field **training** camp only in the high-**low** group (13.4 +/- 10 s), in direct proportion to the increase in VO2 max ($r = 0.65$, $P < 0.01$). Velocity at VO2 max and MSS also improved only in the high-**low** group. Four weeks of **living high-training low** improves sea-level running performance in trained runners due to altitude **acclimatization** (increase in red cell mass volume and VO2 max) and maintenance of sea-level **training** velocities, most likely accounting for the increase in velocity at VO2 max and MSS.

RUNNING

Running on land and water

Int J Sports Med. 2014 Jan;35(1):62-8. doi: 10.1055/s-0033-1345131. Epub 2013 Jun 14.

Muscle Activity during Running in Water and on Dry Land: Matched Physiology.

Masumoto K1, Horsch SE2, Agnelli C2, McClellan J2, Mercer JA2.
Author information

Abstract

We investigated muscle activity during deep water running (DWR) and treadmill running on dry land (TMR) at similar physiological responses. 9 subjects (30.7±10.4 years) participated in this study.

The baseline conditions consisted of TMR at 3 ratings of perceived exertion (RPE) level (RPE 11, 13, and 15) with heart rate (HR) recorded during each condition. The target HR for each level of DWR condition was determined by the HR recorded during the TMR. Muscle activity from the rectus femoris (RF), biceps femoris (BF), tibialis anterior (TA), and gastrocnemius (GA) were measured. As originally planned, HR was not different between modes ($P>0.05$) and was different between exercise intensities ($P<0.001$). Only TA muscle activity was influenced by the interaction of mode and intensity ($P<0.05$). Muscle activity from the GA during DWR was significantly lower than that of TMR (a 34-48% decrease; $P<0.05$), although muscle activity from the remaining tested muscles were not influenced by modes of exercise ($P>0.05$).

These observations suggest that matching HR can be recommended to produce similar magnitude of lower extremity muscle activity during DWR to that of TMR, with the exception of the GA.

PMID: 23771834

Hip/knee differences male and female

Int J Sports Med. 2014 Feb;35(2):153-8. doi: 10.1055/s-0033-1343406. Epub 2013 Jul 18.

Knee and Hip Joint Biomechanics are Gender-specific in Runners with High Running Mileage.

Gehring D, Mornieux G, Fleischmann J, Gollhofer A.
Author information

Abstract

Female runners are reported to be more prone to develop specific knee joint injuries than males. It has been suggested that increased frontal plane joint loading might be related to the incidence of these knee injuries in running. The purpose of this study was to evaluate if frontal plane knee and hip joint kinematics and kinetics are gender-specific in runners with high mileage. 3D-kinematics and kinetics were recorded from 16 female and 16 male runners at a speed of 3 m/s, 4 m/s, and 5 m/s. Frontal plane joint angles and joint moments were ascertained and compared between genders among speed conditions. Across all speed conditions, females showed increased hip adduction and reduced knee adduction angles compared to males ($p<0.003$). The initial peak in the hip adduction moment was enhanced in females ($p=0.003$). Additionally, the hip adduction impulse showed a trend towards an increase in females at slow running speed ($p=0.07$). Hip and knee frontal plane joint kinematics are gender-specific. In addition, there are indications that frontal plane joint loading is increased in female runners. Future research should focus on the relationship of these observations regarding overuse running injuries.

PMID: 23868680

Sprint hamstrings

Scand J Med Sci Sports. 2014 Jan 15. doi: 10.1111/sms.12171.

Reduced biceps femoris myoelectrical activity influences eccentric knee flexor weakness after repeat sprint running.

Timmins RG, Opar DA, Williams MD, Schache AG, Dear NM, Shield AJ.
Author information

Abstract

The aim of this study was to determine whether declines in knee flexor strength following overground repeat sprints were related to changes in hamstrings myoelectrical activity. Seventeen recreationally active men completed maximal isokinetic concentric and eccentric knee flexor strength assessments at 180°/s before and after repeat sprint running. Myoelectrical activity of the biceps femoris (BF) and medial hamstrings (MHs) was measured during all isokinetic contractions. Repeated measures mixed model [fixed factors = time (pre- and post-repeat sprint) and leg (dominant and nondominant), random factor = participants] design was fitted with the restricted maximal likelihood method. Repeat sprint running resulted in significant declines in eccentric, and concentric, knee flexor strength (eccentric = 26 ± 4 Nm, 15% $P < 0.001$; concentric 11 ± 22 Nm, 10% $P < 0.001$). Eccentric BF myoelectrical activity was significantly reduced (10%; $P = 0.035$). Concentric BF and all MH myoelectrical activity were not altered. The declines in maximal eccentric torque were associated with the change in eccentric BF myoelectrical activity ($P = 0.013$). Following repeat sprint running, there were preferential declines in the myoelectrical activity of the BF, which explained declines in eccentric knee flexor strength.

KEYWORDS: Fatigue, eccentric, hamstring injury, isokinetic dynamometry, repeat sprint, surface electromyography PMID: 24422638

Rocker running shoes

Gait Posture. 2013 Dec 9. pii: S0966-6362(13)00698-X. doi: 10.1016/j.gaitpost.2013.12.003.

Effect of rocker shoes on plantar pressure pattern in healthy female runners.

Sobhani S1, van den Heuvel E2, Bredeweg S3, Kluitenberg B3, Postema K4, Hijmans JM5, Dekker R6.

Author information

Abstract

Rocker profile shoes (rocker shoes) are one of the treatment options of metatarsalgia and forefoot stress fractures. The efficacy of rocker shoes in unloading the forefoot pressure has been shown in walking. In running, however, the effect of rocker shoes on forefoot pressure is unknown. Eighteen healthy female runners participated in this study. In-shoe plantar pressures were recorded during running with the standard running shoes and rocker shoes. Shoe comfort was assessed after each shoe measurement. Peak pressure (PP), maximum mean pressure (MMP) and force-time integral (FTI) were determined for seven foot areas. The effects of shoes on the different outcome variables were statistically analyzed using a linear mixed model. Running with the rocker shoes caused a significant reduction ($p<0.001$) in all pressure parameters in the central and lateral forefoot. FTI and MMP were also reduced by 11% and 12% in the medial forefoot while running with rocker shoes. Running with rocker shoes resulted in a significant increase in all pressure parameters at the heel region ($p<0.001$).

Running with rocker shoes received a significant ($p<0.01$) lower comfort rate than running with standard running shoes. Rocker shoes might be beneficial for runners who are recovering from metatarsalgia or stress fractures of the forefoot region, as it reduces plantar pressure in the forefoot region.

KEYWORDS: Overuse injuries, Plantar loading, Rocker bottom shoe, Rocker sole PMID: 24370440

PAIN

Childhood abuse and pain

Psychosomatics. 2013 Oct 23. pii: S0033-3182(13)00203-X. doi: 10.1016/j.psym.2013.10.004.

Childhood Abuse and the Experience of Pain in Adulthood: The Mediating Effects of PTSD and Emotion Dysregulation on Pain Levels and Pain-Related Functional Impairment.

Powers A1, Fani N2, Pallos A2, Stevens J2, Ressler KJ3, Bradley B4.
Author information

Abstract

BACKGROUND:
Previous findings suggest a relationship between childhood abuse and pain-related conditions. It is yet to be determined whether adult posttraumatic stress disorder (PTSD) symptoms may mediate the association between the experience of childhood abuse and reported pain in adulthood.

OBJECTIVE:
We sought to determine if emotion dysregulation may also play a role in mediating PTSD and pain levels.

METHODS:
We examined subjects (N = 814) recruited from the primary care clinics of an urban public hospital as part of an National Institute of Mental Health-funded study of trauma-related risk and resilience. We evaluated childhood abuse with the Childhood Trauma Questionnaire, PTSD symptoms with the PTSD Symptom Severity scale, and emotional dysregulation with the Emotion Dysregulation Scale. Pain and functional limitations of pain were assessed through self-report.

RESULTS:
We found that both childhood abuse and current PTSD symptoms predicted higher levels of reported pain. Childhood abuse, PTSD symptoms, and emotion dysregulation all predicted higher levels of functional impairment related to pain. Using the Sobel method and bootstrapping techniques and controlling for current level of negative affect, we found that PTSD fully mediated the effect of childhood abuse on pain level and pain-related limitations; emotion dysregulation partially mediated the effect of PTSD symptoms in predicting higher levels of pain-related limitations.

CONCLUSIONS:
Although causality cannot be determined in the present study, these findings suggest that PTSD may serve as the pathway between exposure to childhood abuse and the development of pain-related conditions in adulthood, and that emotion dysregulation is a significant factor in understanding how PTSD relates to specific pain-related functional impairment.

 PMID: 24360527

Sleep and activity

Phys Ther. 2014 Jan 16.

Association Between Physical Activity and Sleep in Adults With Chronic Pain: A Momentary, Within-Person Perspective.

Andrews NE, Strong J, Meredith PJ, D'Arrigo RG.
Author information

Abstract

Background Individuals with chronic pain consider improved sleep to be one of the most important outcomes of treatment. Physical activity has been shown to have beneficial effects on sleep in the general population. Despite these findings, the physical activity-sleep relationship has not been directly examined in a sample of people with chronic pain.

Objective. This study aimed to examine the association between objective daytime physical activity and subsequent objective sleep for individuals with chronic pain while controlling for pain and psychosocial variables.

Design.An observational, prospective, within-person study design was used.

Methods.A clinical sample of 50 adults with chronic pain was recruited. Participation involved completing a demographic questionnaire followed by 5 days of data collection. Over this period, participants wore a triaxial accelerometer to monitor their daytime activity and sleep. Participants also carried a handheld computer that administered a questionnaire measuring pain, mood, catastrophizing, and stress 6 times throughout the day.

Results. The results demonstrated that higher fluctuations in daytime activity significantly predicted shorter sleep duration. Furthermore, higher mean daytime activity levels and a greater number of pain sites contributed significantly to the prediction of longer periods of wakefulness at night.

Limitations. The small sample size used in this study limits the generalizability of the findings. Missing data may have led to overestimations or underestimations of effect sizes, and additional factors that may be associated with sleep (eg, medication usage, environmental factors) were not measured.

Conclusions. The results of this study suggest that engagement in high-intensity activity and high fluctuations in activity are associated with poorer sleep at night; hence, activity modulation may be a key treatment strategy to address sleep complaints in individuals with chronic pain.

PMID: 24231224

Biomarkers of inflammation

Nurs Res. 2014 Jan-Feb;63(1):51-62. doi: 10.1097/NNR.0000000000000013.

The association of pain with protein inflammatory biomarkers: a review of the literature.

Devon HA, Piano MR, Rosenfeld AG, Hoppensteadt DA.
Author information

Abstract

BACKGROUND:
Pain is a key diagnostic criterion in many medical conditions. In the absence of self-reported pain, measurement of a proxy for pain, such as an inflammatory biomarker, could aid in diagnosis and disease management.

OBJECTIVES:
The aim was to determine if there is an association between inflammatory biomarkers and self-reported pain in individuals with medical conditions associated with the symptom of pain and to clarify whether inflammatory biomarkers might aid in the diagnostic process.

METHODS:
An integrative literature review was conducted. PubMed, CINAHL, and Cochrane databases were searched for articles published between January 2000 and September 2012. Inclusion criteria were original research testing a relationship between inflammatory biomarkers and pain, pain measurement, laboratory measure of inflammatory biomarkers, and a prospective single-group experimental design or comparative nonrandomized or randomized design. Excluded were studies describing an association between inflammatory biomarkers and treatment, risk, and generation; pathophysiology; or genetic polymorphisms/transcripts. Ten studies meeting inclusion criteria were reviewed.

RESULTS:
In most of the studies, baseline elevations in both proinflammatory and anti-inflammatory cytokines were reported in painful conditions compared with healthy controls. In half of the studies, higher levels of proinflammatory markers (C-reactive protein, tumor necrosis factor-alpha, interleukin-2 [IL-2], IL-6, IL-8, IL-10, and CD40 ligand) were associated with greater pain. Proinflammatory cytokines decreased after treatment for pain in only two studies.

DISCUSSION:
The association between inflammatory markers varied in the direction and magnitude of expression, which may be explained by differences in designs and assays, disease condition and duration, variations in symptom severity, and timing of measurement. Elevation in anti-inflammatory cytokines in the presence of pain represents a homeostatic immune response. Further study is required to determine the value of cytokines as biomarkers of pain.

PMID: 24335913

Chronic pain quality of life

Musculoskeletal Care. 2014 Jan 15. doi: 10.1002/msc.1066.

The Dominance of Chronic Pain: A Phenomenological Study.

Ojala T, Häkkinen A, Karppinen J, Sipilä K, Suutama T, Piirainen A.
Author information

Abstract

BACKGROUND:
Chronic pain is not only a physical disorder, but also a complex combination of biopsychosocial symptoms affecting each other. When in chronic pain, the patient's entire body becomes a source of pain, and eventually the pain occupies the patient's mind and entire life. The aim of the present study was to examine the life experience and management of chronic pain from the patient's perspective.

METHODS:
Thirty-four participants with chronic pain were interviewed. For 21 of the participants, the duration of pain was more than five years. Most of the participants had degenerative spinal pain. The transcribed interviews were analysed using Giorgi's four-phase phenomenological method.

RESULTS:
The results indicated that chronic pain impaired the participant's psychosocial well-being by controlling thoughts and making life itself painful. When life is filled with pain, the entire life is seen through pain. Continuity, unpredictability and the fear of the pain decreased quality of life. As a result of the interviews, the following subthemes were identified, based on the essential theme of 'the dominance of chronic pain': namely: 'pain is the master', 'life is not worth living', 'contextual pain' and 'waiting and hoping'.

CONCLUSIONS:
Chronic pain may decrease the quality of the patient's life to such an extent that it may be regarded as not worth living. Multidisciplinary management of chronic pain may lead to a better health status and diminish the adverse consequences of chronic pain. Copyright © 2014 John Wiley & Sons, Ltd.

KEYWORDS: Chronic pain, dominance, phenomenology PMID: 24425247

Suicide potential

Scandinavian Journal of Pain Volume 5, Issue 1 , Pages 4-7, January 2014

Suicide attempts in chronic pain patients. A register-based study

Elsebeth Stenager, Erik Christiansen, Gitte Handberg, Børge Jensen

Abstract

Background There are several studies about the relationship between depression and chronic non-malignant pain. These studies have shown that up to 50% of chronic pain patients are suffering from depression. It is, therefore, reasonable to expect that pain patients would also have an increased risk of suicidal behaviour. This problem is not well studied. Since 1990 the Centre for Suicide Research, Odense, Denmark has registered all suicide attempts in patients residing in the Region of Funen, Denmark. The Pain Clinic, Odense University Hospital receives patients with chronic pain from the entire Region of Southern Denmark.

Purpose The purpose of the study has been: To investigate, whether patients treated in the Pain Clinic during the period from 1 January 2004 to 31 December 2009 had an increased risk of suicide attempts compared with the background population.

Materials and methods The Register for Suicide Attempts (RSA) is a product of the WHO research programme WHO/EURO Multicentre Study on Para suicide. The RSA is a longitudinal person-based register. It contains information about people who have been in contact with the health care system in the County of Funen as a result of a suicide attempt.

The Pain Clinic, Odense University Hospital receives patients with non-malignant chronic pain from the Region of Southern Denmark with 1,194,659 inhabitants. Data about age, sex, and time of treatment for patients treated in the Pain Clinic during the period were registered. Time and method of the suicide attempts were registered in the RSA. By registry linkages between the patient registers it was possible to calculate any excess risk of suicide attempts in chronic pain patients in the study period.We used a cohort design and calculated incidence rates (IR) and incidence rate ratios (IRRs) for suicide attempts, based on data from RSA. Poisson Regression analyses were used for calculation of IR and IRR for suicide attempts.

Results In the study period from 1 January 2004 to 31 December 2009 1871 patients residing in the Region of Funen in Denmark were referred to The Pain Clinic. In the patient group 258 suicide attempts in 110 persons were registered. In all 6% of the patient group had attempted suicide. An increased risk of suicide attempts was found in the pain population as the incidence rate ratio (IRR) was 3.76 95% CI (3.22; 4.40). No statistical significant differences between men and women were found.

Conclusion In a chronic non-malignant pain population, referred to a pain clinic, the risk of suicide attempts was increased.

Implications It is important to be aware of risk factors for suicidal behaviour, i.e. pain history, depression, anxiety, abuse problems, and social problems when caring for patients with chronic pain. More knowledge and training of the staff caring for chronic pain patients are needed to decrease the risk of suicidal behaviour.

Keywords: Chronic pain, Suicide attempts, Register study

Pain and distress

Emerg Med J. 2013 Dec 23. doi: 10.1136/emermed-2013-202860.

Not all suffering is pain: sources of patients' suffering in the emergency department call for improvements in communication from practitioners.

Body R, Kaide E, Kendal S, Foex B.
Author information

Abstract

BACKGROUND:
Provision of prompt, effective analgesia is rightly considered as a standard of care in the emergency department (ED). However, much suffering is not 'painful' and may be under-recognised. We sought to describe the burden of suffering in the ED and explore how this may be best addressed from a patient centred perspective.

METHODS:
In a prospective cohort study, we included undifferentiated patients presenting to the ED. We undertook two face to face questionnaires with the first immediately following triage. We asked patients: (a) if they were 'suffering'; (b) how they were suffering; and (c) what they hoped would be done to ease this. Prior to leaving the ED, we asked patients what had been done to ease their suffering. Data were analysed thematically.

RESULTS:
Of 125 patients included, 77 (61.6%) reported suffering on direct questioning and 92 (73.6%) listed at least one way in which they were suffering. 90 (72.0%) patients had a pain score >0/10 but only 37 (29.6%) reported that pain was causing suffering. Patients reported suffering from both physical symptoms (especially pain, nausea, vomiting and dizziness) and emotional distress (notably anxiety). Treatment (to ease physical and emotional symptoms), information (particularly diagnosis, reassurance and explanation), care (notably friendly staff) and closure (being seen, resolving the problem and going home) were the key themes identified as important for relief of suffering.

CONCLUSIONS:
In seeking to ease suffering in the ED, clinicians must focus not only on providing analgesia but on treating Emotional distress, Physical symptoms, providing Information, Care and Closure (EPICC).

KEYWORDS: clinical assessment, effectiveness, communications, patient support, psychology, patient support PMID: 24366946

Bone health marital status

Osteoporos Int. 2014 Jan 15.

Marital histories, marital support, and bone density: findings from the Midlife in the United States Study.

Miller-Martinez D, Seeman T, Karlamangla AS, Greendale GA, Binkley N, Crandall CJ.
Author information

Abstract

We examined the association between marital life history and bone mineral density (BMD) in a national sample from the US. In men, being stably married was independently associated with better lumbar spine BMD, and in women, more spousal support was associated with better lumbar spine BMD.

INTRODUCTION:

Adult bone mass may be influenced by stressors over the life course. We examined the association between marital life history and bone mineral density (BMD) net socioeconomic and behavioral factors known to influence bone mass. We sought evidence for a gender difference in the association between marital history and adult BMD.

METHODS:

We used data from 632 adult participants in the Midlife in the United States Study to examine associations between marital history and BMD, stratified by gender, and adjusted for age, weight, menopausal stage, medication use, childhood socioeconomic advantage, adult financial status, education, physical activity, smoking, and alcohol consumption.

RESULTS:

Compared to stably married men, men who were currently divorced, widowed, or separated, men who were currently married but previously divorced, widowed, or separated, and never married men had 0.33 (95 % CI: 0.01, 0.65), 0.36 (95 % CI: 0.10, 0.83), and 0.53 (95 % CI: 0.23, 0.83) standard deviations lower lumbar spine BMD, respectively. Among men married at least once, every year decrement in age at first marriage (under age 25) was associated with 0.07 SD decrement in lumbar spine BMD (95 % CI: 0.002, 0.13). In women, greater support from the spouse was associated with higher lumbar spine BMD.

CONCLUSIONS:

Our findings suggest that marriage before age 25 and marital disruptions are deleterious to bone health in men, and that marital quality is associated with better bone health in women.

PMID: 24424630

Mirror therapy

PM R. 2014 Jan 9. pii: S1934-1482(14)00018-5. doi: 10.1016/j.pmrj.2014.01.005.

Mirror Visual Feedback for Phantom Pain: International experience on modalities and side effects discussed by expert panel. A Delphi Study.

Hagenberg A1, Carpenter DC2.
Author information

Abstract

BACKGROUND:
MVF (mirror therapy) is practised worldwide in very different ways to alleviate phantom pain; no study has compared these variations yet or researched risk and harm.

OBJECTIVES:
To establish usage and justification of a generally accepted MVF treatment plan after amputation, to explore occurrence and handling of side effects, and to increase knowledge on contributing factors.

METHODS:
Experiential knowledge of 13 experienced practitioners from six countries and five professions was explored with a three round Delphi technique.

RESULTS:
Experience with the use of five different treatment plans was described of which one has never been mentioned in the literature: an intense one-off plan where the illusion was carefully set up before the patient was left to the experience with no interference, resolving pain as well as side effects. In the four known treatment plans, the expectations of response time varied which influenced the definition of responders/non-responders, the set-ups, control and use of material reflected the professional background of the practitioners. Contraindications were also defined according to the professional confidence to deal with the side effects. Side effects were reported including emotional reactions, pain increase, sensory changes, freezing of the phantom limb, and dizziness and sweating. The attitude toward and the handling of side effects varied in patients as in practitioners according to their professional background. A tool to fine-tune the experience was reported with covering the limb during therapy. Full consensus was reached on several treatment modalities.

CONCLUSION:
The results suggest that the different treatment plans suit different patients and practitioners. Matching these could enhance effectiveness and compliance. Knowledge about side effects needs to inform treatment decisions. These findings triggered the development of a MVF gateway to guide patients to the treatment plan for their needs and collect data from the practitioners to enhance neuroscientific understanding and inform practice.

 PMID: 24412264

Chronic pain sensitization

Clin J Pain. 2014 Feb;30(2):119-28. doi: 10.1097/AJP.0b013e318287aac7.\

Characteristics of sensitization associated with chronic pain conditions.

Vierck CJ, Wong F, King CD, Mauderli AP, Schmidt S, Riley JL 3rd.
Author information

Abstract

OBJECTIVES:
To describe and understand varieties and characteristics of sensitization contributing to hyperalgesia in participants with chronic pain conditions.

METHODS:
Thermal stimulation was delivered to the face, forearm, and calf of pain-free participants and individuals with irritable bowel syndrome, temporomandibular pain disorder (TMD), and fibromyalgia syndrome (FM). Three-second contacts by a preheated thermode occurred at 30-second intervals in ascending and then in descending series (0.7°C steps).

RESULTS:
Thermal pain ratings during ascending series were greater at each site in individuals diagnosed with chronic pain. Intense pain at the time of testing further enhanced the ratings at all sites, but mild or moderate clinical pain did not have this effect. Thermal pain in all participants was greater during descending series compared with the ascending series of arm and leg stimulation. The hypersensitivity during the descending series was comparable in pain-free, FM and TMD participants but was increased in duration for arm or leg stimulation of FM participants.

DISCUSSION:
The widespread sensitization for irritable bowel syndrome and TMD participants does not rely on mechanisms of spatial and temporal summation often invoked to explain widespread hyperalgesia associated with chronic pain. Increased sensitivity during descending series of stimulation of an arm or leg but not the face indicates a propensity for sensitization of nociceptive input to the spinal cord. Abnormally prolonged sensitization for FM participants reveals a unique influence of widespread chronic pain referred to deep somatic tissues.

PMID: 23629594

Cognitive impact of pain

PLoS One. 2013 Dec 30;8(12):e83272. doi: 10.1371/journal.pone.0083272.

The disruptive effects of pain on complex cognitive performance and executive control.

Keogh E1, Moore DJ2, Duggan GB2, Payne SJ3, Eccleston C2.
Author information

Abstract

Pain interferes and disrupts attention. What is less clear is how pain affects performance on complex tasks, and the strategies used to ensure optimal outcomes.

The aim of the current study was to examine the effect of pain on higher-order executive control processes involved in managing complex tasks. Sixty-two adult volunteers (40 female) completed two computer-based tasks: a breakfast making task and a word generation puzzle. Both were complex, involving executive control functions, including goal-directed planning and switching. Half of those recruited performed the tasks under conditions of thermal heat pain, and half with no accompanying pain. Whilst pain did not affect central performance on either task, it did have indirect effects. For the breakfast task, pain resulted in a decreased ability to multitask, with performance decrements found on the secondary task. However, no effects of pain were found on the processes thought to underpin this task. For the word generation puzzle, pain did not affect task performance, but did alter subjective accounts of the processes used to complete the task; pain affected the perceived allocation of time to the task, as well as switching perceptions. Sex differences were also found.

When studying higher-order cognitive processes, pain-related interference effects are varied, and may result in subtle or indirect changes in cognition.

PMID: 24386168

Dural inflammation

J Neural Transm. 2013 Dec 24.

Dural neurogenic inflammation induced by neuropathic pain is specific to cranial region.

Filipović B, Matak I, Lacković Z.
Author information

Abstract

Up to now, dural neurogenic inflammation (DNI) has been studied primarily as a part of migraine pain pathophysiology. A recent study from our laboratory demonstrated the occurrence of DNI in response to peripheral trigeminal nerve injury. In this report, we characterize the occurrence of DNI after different peripheral nerve injuries in and outside of the trigeminal region.

We have used the infraorbital nerve constriction injury model (IoNC) as a model of trigeminal neuropathic pain. Greater occipital nerve constriction injury (GoNC), partial transection of the sciatic nerve (ScNT) and sciatic nerve constriction injury (SCI) were employed to characterize the occurrence of DNI in response to nerve injury outside of the trigeminal region. DNI was measured as colorimetric absorbance of Evans blue plasma protein complexes. In addition, cellular inflammatory response in dural tissue was histologically examined in IoNC and SCI models. In comparison to the strong DNI evoked by IoNC, a smaller but significant DNI has been observed following the GoNC. However, DNI has not been observed either in cranial or in lumbar dura following ScNT and SCI. Histological evidence has demonstrated a dural proinflammatory cell infiltration in the IoNC model, which is in contrast to the SCI model. Inflammatory cell types (lymphocytes, plasma cells, and monocytes) have indicated the presence of sterile cellular inflammatory response in the IoNC model.

To our knowledge, this is the first observation that the DNI evoked by peripheral neuropathic pain is specific to the trigeminal area and the adjacent occipital area. DNI after peripheral nerve injury consists of both plasma protein extravasation and proinflammatory cell infiltration.

PMID: 24366531

Dementia and pain memory

When pain memories are lost: A pilot study of semantic knowledge of pain in dementia
Pain Medicine, 01/09/2014

Oosterman JM, et al. –

This project aimed to explore semantic concepts of pain in people with dementia and whether this is associated with clinical pain report. This study is the first to show that semantic memory for pain is diminished in dementia patients. When using clinical pain tools, clinicians should consider these effects which may bias clinical pain ratings when they evaluate and manage pain in these patients. This might improve the recognition and management of pain in people with dementia.

Methods

Cohort study with nested cross-sectional analysis.

Acute general hospital medical wards for older people.

People with dementia (N=26) and control participants (N=13).

Two subtests of semantic memory for pain: 1) Identifying painful situations from a standardized range of pictures; 2) Describing the concept of pain.

Participants also indicated whether they were in pain or not, were observed for pain (PAINAD scale) and completed the Wong–Baker FACES scale to indicate pain severity.

Results

- Compared with the control group, people with dementia were less able to identify painful situations and used fewer categories to define their concept of pain.

In turn, the performance on these two measures was related to the reported presence and, albeit less strongly, to the reported severity of pain, indicating that a reduction in semantic memory for pain is associated with a decline in reported pain.

Pain and somaticizing

Eur J Pain. 2014 Jan 7. doi: 10.1002/j.1532-2149.2013.00440.x.

Facial affect perception and mentalizing abilities in female patients with persistent somatoform pain disorder.

Schönenberg M, Mares L, Smolka R, Jusyte A, Zipfel S, Hautzinger M.
Author information

Abstract

BACKGROUND:
Numerous studies have demonstrated a robust link between alexithymic traits and somatic complaints in patients suffering from psychosomatic disorders, while less is known about disease-related impairments in the processing of affective social information. Deficits in emotion recognition can lead to misinterpretations of social signals and induce distress in interpersonal interactions. This, in turn, might contribute to somatoform symptomatology in affected individuals. The aim of the present study was to investigate basal facial affect recognition as well as higher-order cognitive mind-reading skills in order to further clarify the association between alexithymia and the processing of social affective information in a homogenous sample of patients suffering from somatoform pain.

METHODS:
We employed a series of animated morph clips that gradually displayed the onset and development of the six basic emotional expressions to investigate facial affect perception in a female sample of patients diagnosed with persistent somatoform pain disorder (PSPD) and matched healthy controls. In addition, all participants were presented with the Movie for the Assessment of Social Cognition to explore mind-reading abilities.

RESULTS:
Specifically impaired mentalizing skills and increased alexithymic traits were observed in PSPD, while emotional facial expression recognition appeared to be intact in these patients.

CONCLUSIONS:
PSPD subjects tend to overattribute inappropriate affective states to others, which could be the consequence of the inability to adequately experience and express their own emotional reactions. This cognitive bias might lead to the experience of poor psychosocial functioning and has the potential to negatively impact the course and outcome of this psychopathology.

 PMID: 24395204

Return to work/depression

Physical functioning after occupational rehabilitation and returning to work among employees with chronic musculoskeletal pain and comorbid depressive symptoms

Journal of Multidisciplinary Healthcare, 01/31/2014 **Clinical Article**

Ernstsen L, et al. –

The aim of this investigation was to assess whether measures of physical functioning after multidisciplinary rehabilitation are associated with return to work among individuals with chronic musculoskeletal pain conditions and comorbid depressive symptoms. The findings of an inverse relationship between self–reported physical function and returning to work in this sample illustrate that the return–to–work process among employees with chronic musculoskeletal pain and comorbid depressive symptoms is multifactorial and influenced by factors other than physical functioning at the individual level. Further research, especially longitudinal studies, is needed to assess the occupational trajectories among employees with chronic musculoskeletal pain and comorbid depressive symptoms after participation in a multidisciplinary rehabilitation program.

Pain and impact on relationships

Pain Med. 2014 Jan 21. doi: 10.1111/pme.12366.

Impact of Pain Intensity on Relationship Quality Between Couples Where One Has Back Pain.

Vivekanantham A, Campbell P, Mallen CD, Dunn KM.
Author information

Abstract

OBJECTIVES:
To investigate associations of pain intensity in those with long-term back pain, with their partners' rating of key constructs of relationship quality: cohesion (activities together), consensus (affection, sexual relations), satisfaction (conflict, regrets).

METHODS:
Self-report questionnaires on relationship quality (partner-rated), depression (partner-rated), relationship length, and pain intensity (patient-rated) were collected from back pain patients and their partners (N = 71). Linear regression was carried out to test for associations, standardized coefficients (β) and 95% confidence intervals (95% CI) are reported.

RESULTS:
There was no main effect between patient pain intensity and partner rating of relationship quality. However, partner ratings of relationship quality were lower if the partner reported increasing depressive symptoms. Adjusting for the effects of partner depression show that ratings of consensus (affection, sexual relations) from partners were actually higher with increasing levels of pain intensity in patients (β 0.54, 95% CI 0.17 to 0.90, $P < 0.01$). Furthermore lower ratings of consensus were reported where patient pain intensity interacted with partner depression (β -0.11, 95% CI-0.19 to -0.03, $P < 0.05$).

CONCLUSIONS:
These findings illustrate the association of pain outcomes beyond the patient within a primary care sample. Moderators of the responses about the relationship construct of consensus generated by partners appear to be partners' own level of depressive symptoms and whether their depressive symptoms are associated with the patients' pain intensity. Consultations should consider the social context of patients with pain.

KEYWORDS: Depression, Pain, Partner, Relationship Quality, Spouse PMID: 24447290

Touch and pain

Pain. 2013 Dec 18. pii: S0304-3959(13)00673-8. doi: 10.1016/j.pain.2013.12.024

Pain relief by touch: a quantitative approach.

Mancini F1, Nash T2, Iannetti GD3, Haggard P4.
Author information

Abstract
Pain relief by touch has been studied for decades in pain neuroscience. Human perceptual studies revealed analgesic effects of segmental tactile stimulation, as compared to extra-segmental touch. However, the spatial organization of touch-pain interactions within a single human dermatome has not been investigated yet. In two experiments, we tested whether, how, and where within a dermatome touch modulates the perception of laser-evoked pain. We measured pain perception using intensity ratings, qualitative descriptors, and signal detection measures of sensitivity and response bias. Touch concurrent with laser pulses produced a significant analgesia, and reduced the sensitivity in detecting the energy of laser stimulation, implying a functional loss of information within the ascending Aδ pathway. Touch also produced a bias to judge laser stimuli as less painful. This bias decreased linearly when the distance between the laser and tactile stimuli increased. Thus, our study provides evidence for a spatial organization of intra-segmental touch-pain interactions.

KEYWORDS: Analgesia, Pain, Relief, Signal detection theory, Space, Touch PMID: 24361816

Complex regional Pain

Pain thresholds CRP

in. 2013 Dec 12. pii: S0304-3959(13)00662-3. doi: 10.1016/j.pain.2013.12.014.

Comparison of muscle and joint pressure-pain thresholds in patients with complex regional pain syndrome and upper limb pain of other origin.

Mainka T1, Bischoff FS2, Baron R3, Krumova EK4, Nicolas V5, Pennekamp W5, Treede RD6, Vollert J2, Westermann A2, Maier C2.

Author information

Abstract

Pain localized in the deep tissues occurs frequently in complex regional pain syndrome (CRPS).

In addition, hyperalgesia to blunt pressure over muscles is common in CRPS, but it often appears in limb pain of other origin as well. Considering that 3-phase bone scintigraphy (TPBS) reveals periarticular enhanced bone metabolism in CRPS, joint-associated hyperalgesia to blunt pressure might be a more specific finding than hyperalgesia over muscles. In 34 patients with upper limb pain (18 CRPS, 16 non-CRPS; diagnosed in accordance to the Budapest criteria) and in 18 healthy controls, pressure-pain thresholds (PPT) were assessed bilaterally over the thenar (PPTThenar), the metacarpophalangeal (PPTMCP), and the proximal interphalangeal (PPTPIP) joints using a pressure algometer (Somedic, Sweden). Beforehand, all patients had received TPBS for diagnostic purposes independently of the study. Region-of-interest (ROI) ratios (mineralization phase) for the MCP and PIP, excluding fracture sites, were correlated with the PPT. In CRPS, all ROI ratios were significantly increased and all PPT of the affected hand were decreased compared to non-CRPS (PPTThenar: 243±150kPa vs 358±197kPa, PPTMCP: 80±67kPa vs 159±93kPa, PPTPIP: 80±56kPa vs 184±110kPa; P<.01) and controls (PPTThenar: 478±106kPa, PPTMCP: 254±50kPa, PPTPIP: 275±76kPa; P<.01). A PPTThenar below 293kPa revealed 77% sensitivity but only 63% specificity, whereas a PPTPIP below 102kPa had 82% sensitivity and 94% specificity to identify CRPS. Only in CRPS were PPTMCP and PPTPIP correlated significantly inversely with the ROI ratio (MCP: r=-0.439, PIP: r=-0.447). PPTPIP shows higher specificity for CRPS type I than PPTThenar without loss of sensitivity.

Therefore, measurement of joint PPT could be a noninvasive diagnostic tool reflecting increased bone metabolism assessed by TPBS as a sign of bone pathophysiology.

KEYWORDS: Complex regional pain syndrome (CRPS), Inflammation, Pressure-pain threshold, Quantitative sensory testing, Three-phase bone scintigraphy PMID: 24333949

CRP Brain changes

PLoS One. 2014 Jan 9;9(1):e85372. doi: 10.1371/journal.pone.0085372. eCollection 2014.

Complex regional pain syndrome type I affects brain structure in prefrontal and motor cortex.

Pleger B1, Draganski B2, Schwenkreis P3, Lenz M3, Nicolas V4, Maier C5, Tegenthoff M3.

Abstract

The complex regional pain syndrome (CRPS) is a rare but debilitating pain disorder that mostly occurs after injuries to the upper limb.

A number of studies indicated altered brain function in CRPS, whereas possible influences on brain structure remain poorly investigated. We acquired structural magnetic resonance imaging data from CRPS type I patients and applied voxel-by-voxel statistics to compare white and gray matter brain segments of CRPS patients with matched controls. Patients and controls were statistically compared in two different ways: First, we applied a 2-sample ttest to compare whole brain white and gray matter structure between patients and controls. Second, we aimed to assess structural alterations specifically of the primary somatosensory (S1) and motor cortex (M1) contralateral to the CRPS affected side. To this end, MRI scans of patients with left-sided CRPS (and matched controls) were horizontally flipped before preprocessing and region-of-interest-based group comparison. The unpaired ttest of the "non-flipped" data revealed that CRPS patients presented increased gray matter density in the dorsomedial prefrontal cortex. The same test applied to the "flipped" data showed further increases in gray matter density, not in the S1, but in the M1 contralateral to the CRPS-affected limb which were inversely related to decreased white matter density of the internal capsule within the ipsilateral brain hemisphere. The gray-white matter interaction between motor cortex and internal capsule suggests compensatory mechanisms within the central motor system possibly due to motor dysfunction.

Altered gray matter structure in dorsomedial prefrontal cortex may occur in response to emotional processes such as pain-related suffering or elevated analgesic top-down control.

PMID: 24416397

DRG

Pain Pract. 2014 Jan 23. doi: 10.1111/papr.12170.

Stimulation of Dorsal Root Ganglia for the Management of Complex Regional Pain Syndrome: A Prospective Case Series.

Van Buyten JP, Smet I, Liem L, Russo M, Huygen F.

Abstract

BACKGROUND:

Complex regional pain syndrome (CRPS) is a chronic and progressive pain condition usually involving the extremities and characterized by sensorimotor, vascular, and trophic changes. Spinal cord stimulation (SCS) is an effective intervention for this condition, but is hampered by the technical challenges associated with precisely directing stimulation to distal extremities. Dorsal root ganglia (DRG) may be more effective as a physiological target for electrical modulation due to recruitment of the primary sensory neurons that innervate the painful distal anatomical regions.

METHODS:

Eleven subjects diagnosed with uni- or bilateral lower-extremity CRPS were recruited as part of a larger study involving chronic pain of heterogeneous etiologies. Quadripolar epidural leads of a newly developed neurostimulation system were placed near lumbar DRGs using conventional percutaneous techniques. The neurostimulators were trialed; 8 were successful and permanently implanted and programed to achieve optimal pain-paresthesia overlap.

RESULTS:

All 8 subjects experienced some degree of pain relief and subjective improvement in function, as measured by multiple metrics. One month after implantation of the neurostimulator, there was significant reduction in average self-reported pain to 62% relative to baseline values. Pain relief persisted through 12 months in most subjects. In some subjects, edema and trophic skin changes associated with CRPS were also mitigated and function improved. Neuromodulation of the DRG was able to provide excellent pain-paresthesia concordance in locations that are typically hard to target with traditional SCS, and the stimulation reduced the area of pain distributions.

CONCLUSIONS:

Neuromodulation of the DRG appears to be a promising option for relieving chronic pain and other symptoms associated with CRPS. The capture of discrete painful areas such as the feet, combined with stable paresthesia intensities independent of body position, suggests this stimulation modality may allow more selective and consistent targeting of painful areas than traditional SCS.

 KEYWORDS: complex regional pain syndrome, dorsal root ganglion, neuromodulation, prospective case study, spinal cord stimulation PMID: 24451048

Force production/posture

Eur J Pain. 2014 Jan 2. doi: 10.1002/j.1532-2149.2013.00446.x.

Force modulation deficits in complex regional pain syndrome: A potential role for impaired sense of force production.

Bank PJ, van Rooijen DE, Marinus J, Reilmann R, van Hilten JJ.

Abstract

BACKGROUND:
Compelling evidence points at both impaired proprioception and disturbed force control in patients with chronic complex regional pain syndrome (CRPS). Because force modulation at least partly relies on proprioception, we evaluated if impaired sense of force production contributes to disturbances of force control in patients with CRPS.

METHODS:
Characteristics of voluntary force modulation were examined in the affected upper extremity in 28 CRPS patients with abnormal postures, in 12 CRPS patients without abnormal postures, and in 32 healthy controls. Isometric grip-force matching was compared between conditions with and without visual feedback to identify potential deficits in the sense of force production in terms of force reproduction errors.

RESULTS:
Voluntary force modulation was impaired in CRPS patients, but more so in patients with abnormal postures. In particular, CRPS patients with abnormal postures were characterized by reduced maximum force, reduced ability to increase force output according to task instructions, higher variability of force output and less adequate correction of deviations from the target force. Although effects of visual feedback removal appeared largely similar for the two patient groups and controls, our findings with respect to force reproduction errors suggested that an impaired sense of force production may contribute to the motor dysfunction in CRPS.

CONCLUSIONS:
CRPS patients, in particular those with abnormal postures, showed impaired voluntary force control and an impaired sense of force production. This suggests that therapeutic strategies aimed at restoration of proprioceptive impairments, possibly using online visual feedback, may promote the recovery of motor function in CRPS.

 PMID: 24382670

Fibromyalgia

Depression in FM and RA

Nord J Psychiatry. 2014 Feb;68(2):88-92. doi: 10.3109/08039488.2013.782566. Epub 2013 Apr 16.

Self-reported symptoms of pain and depression in primary fibromyalgia syndrome and rheumatoid arthritis.

Scheidt CE, Mueller-Becsangèle J, Hiller K, Hartmann A, Goldacker S, Vaith P, Waller E, Lacour M.
Author information

Abstract

Abstract

Background: Primary fibromyalgia syndrome (FMS) is associated with substantial psychiatric comorbidity. The aim of the present study was to investigate the interrelationship between self-reported symptoms of depression and pain in FMS compared with rheumatoid arthritis (RA).

Methods: In a cross-sectional study, 100 patients with FMS and 50 patients with RA were compared with regard to depression and psychopathology using the Symptom Check List (SCL-27). Group comparisons were calculated by parametric and non-parametric tests. The association between pain intensity and depression was determined by correlation analyses and multivariate statistical procedures (CATREG).

Results: Pain intensity was significantly higher in FMS compared with RA. FMS patients also scored significantly higher on all subscales of the SCL-27 including the depression scale and the General Symptom Index (GSI) ($P < 0.001$). These group differences remained stable even after correcting for pain intensity. Correlation analyses revealed an association between pain intensity and depression in FMS but not in RA ($R = 0.419$, $P < 0.001$).

Conclusion: FMS patients in tertiary referral centers suffer from higher levels of pain intensity than RA patients. Depression predicts levels of pain in FMS but not in RA and is therefore an important target of intervention.

PMID: 23586534

Exercise impact on FM

Cochrane Database Syst Rev. 2013 Dec 20;12:CD010884. doi: 10.1002/14651858.CD010884.

Resistance exercise training for fibromyalgia. Busch AJ, Webber SC, Richards RS, Bidonde J, Schachter CL, Schafer LA, Danyliw A, Sawant A, Dal Bello-Haas V, Rader T, Overend TJ.

BACKGROUND: Fibromyalgia is characterized by chronic widespread pain that leads to reduced physical function. Exercise training is commonly recommended as a treatment for management of symptoms. We examined the literature on resistance training for individuals with fibromyalgia. Resistance training is exercise performed against a progressive resistance with the intention of improving muscle strength, muscle endurance, muscle power, or a combination of these. **MAIN RESULTS:** The literature search yielded 1865 citations with five studies meeting the selection criteria. One of the studies that had three arms contributed data for two comparisons. In the included studies, there were 219 women participants with fibromyalgia, 95 of whom were assigned to resistance training programs. Three randomized trials compared 16 to 21 weeks of moderate- to high-intensity resistance training versus a control group. Two studies compared eight weeks of progressive resistance training (intensity as tolerated) using free weights or body weight resistance exercise versus aerobic training (ie, progressive treadmill walking, indoor and outdoor walking), and one study compared 12 weeks of low-intensity resistance training using hand weights (1 to 3 lbs (0.45 to 1.36 kg)) and elastic tubing versus flexibility exercise (static stretches to major muscle groups).Statistically significant differences (MD; 95% CI) favoring the resistance training interventions over control group(s) were found in multidimensional function (Fibromyalgia Impact Questionnaire (FIQ) total decreased 16.75 units on a 100-point scale; 95% CI -23.31 to -10.19), self reported physical function (-6.29 units on a 100-point scale; 95% CI -10.45 to -2.13), pain (-3.3 cm on a 10-cm scale; 95% CI -6.35 to -0.26), tenderness (-1.84 out of 18 tender points; 95% CI -2.6 to -1.08), and muscle strength (27.32 kg force on bilateral concentric leg extension; 95% CI 18.28 to 36.36).Differences between the resistance training group(s) and the aerobic training groups were not statistically significant for multidimensional function (5.48 on a 100-point scale; 95% CI -0.92 to 11.88), self reported physical function (-1.48 units on a 100-point scale; 95% CI -6.69 to 3.74) or tenderness (SMD -0.13; 95% CI -0.55 to 0.30). There was a statistically significant reduction in pain (0.99 cm on a 10-cm scale; 95% CI 0.31 to 1.67) favoring the aerobic groups.Statistically significant differences were found between a resistance training group and a flexibility group favoring the resistance training group for multidimensional function (-6.49 FIQ units on a 100-point scale; 95% CI -12.57 to -0.41) and pain (-0.88 cm on a 10-cm scale; 95% CI -1.57 to -0.19), but not for tenderness (-0.46 out of 18 tender points; 95% CI -1.56 to 0.64) or strength (4.77 foot pounds torque on concentric knee extension; 95% CI -2.40 to 11.94). This evidence was classified low quality due to the low number of studies and risk of bias assessment. There were no statistically significant differences in attrition rates between the interventions. In general, adverse effects were poorly recorded, but no serious adverse effects were reported. Assessment of risk of bias was hampered by poor written descriptions (eg, allocation concealment, blinding of outcome assessors). The lack of a priori protocols and lack of care provider blinding were also identified as methodologic concerns.**AUTHORS' CONCLUSIONS:** The evidence (rated as low quality) suggested that moderate- and moderate- to high-intensity resistance training improves multidimensional function, pain, tenderness, and muscle strength in women with fibromyalgia. The evidence (rated as low quality) also suggested that eight weeks of aerobic exercise was superior to moderate-intensity resistance training for improving pain in women with fibromyalgia. There was low-quality evidence that 12 weeks of low-intensity resistance training was superior to flexibility exercise training in women with fibromyalgia for improvements in pain and multidimensional function. There was low-quality evidence that women with fibromyalgia can safely perform moderate- to high-resistance training. PMID: 24362925

Suicide

Pain Pract. 2014 Jan 17. doi: 10.1111/papr.12164.

Suicidal Ideation in Patients with Fibromyalgia: A Cross-Sectional Study.

Calandre EP, Navajas-Rojas MA, Ballesteros J, Garcia-Carrillo J, Garcia-Leiva JM, Rico-Villademoros F.

Abstract

Chronic pain, sleep disturbances, and depression, which are relevant symptoms of fibromyalgia syndrome, have been demonstrated to be associated with an increased likelihood of suicidal behaviors.

Mortality from suicide has been shown to be greater among patients with fibromyalgia. This study aimed to assess the prevalence of suicidal ideation among a sample of patients with fibromyalgia and to evaluate its relationship with the clinical symptomatology of fibromyalgia. Baseline data from fibromyalgia patients willing to participate in different clinical studies were collected. Outcome measures included the Fibromyalgia Impact Questionnaire, the Beck Depression Inventory, the Pittsburgh Sleep Quality Index, the Brief Pain Inventory, and the SF-12 Health Survey. The scores for these scales were compared between patients with and without suicidal ideation. The presence of suicidal ideation was assessed using the answer provided to item 9 of the Beck Depression Inventory. The results were adjusted by age, sex, total comorbidity, and time since diagnosis with multiple linear regression. The sample comprised 373 patients of whom one hundred and seventy-nine (48%) reported suicidal ideation: 148 (39.7%) reported passive suicidal ideation and 31 (8.3%) active suicidal ideation.

Suicidal ideation was markedly associated with depression, anxiety, sleep quality, and global mental health, whereas only weak relationships were observed between suicidal ideation and both pain and general physical health.

 KEYWORDS: cross-sectional study, depression, fibromyalgia, suicidal ideation PMID: 24433278

NUTRITION/VITAMINS

Vit D deficiency in Athletes

Severely vitamin D-deficient athletes present smaller hearts than sufficient athletes □

European Journal of Preventive Cardiology, 01/09/2014 **Clinical Article**
Allison RJ, et al.

Abstract

Background Vitamin D (25(OH)D) deficiency has associations with bowl/colon cancer, arthritis, diabetes, and cardiovascular disease. Many athletes are vitamin D deficient, yet no studies have examined the association between 25(OH)D status and cardiac structure and function in healthy athletes.

Design A total of 506 national-level athletes [football (50%), handball (23%), volleyball (16%), and basketball (11%)] and 244 control participants presented for precompetition medical assessment. Controls were healthy individuals registered with a sporting federation undertaking <2 h of exercise per week.

Methods All individuals undertook a physical examination, 12-lead electrocardiogram, echocardiogram, and serum 25(OH)D evaluation.

Results From 506 athletes and 244 controls, 23 and 12.3% demonstrated 25(OH)D sufficiency (>30 ng/ml), 30 and 23.4% insufficiency (20–30 ng/ml), 37.2 and 48.8% deficiency (10–20 ng/ml), and 11 and 15.6% severe deficiency (<10 ng/ml). Severely 25(OH)D-deficient athletes present significantly ($p < 0.05$) smaller aortic root and left atria diameters, intraventricular septum diameter (IVSd), left ventricular diameter during diastole (LVIDd), left ventricular mass (LVM), left ventricular volume during diastole (LVvolD), and right atrial (RA) area than insufficient and sufficient athletes. Furthermore, following logarithmic transformation adjusting 25(OH)D for age, body surface area, ethnicity, and athletic participation, positive associations were observed between 25(OH)D and IVSd, LVIDd, posterior wall thickness during diastole, LVM, and LVvolD in athletes but not in the control participants.

Conclusions Severely 25(OH)D-deficient athletes present significantly smaller cardiac structural parameters than insufficient and sufficient athletes. Future research should investigate the precise mechanism(s) causing cardiac hypertrophy with increases in serum 25(OH)D in healthy athletes.

Vit D 3 and bone

Nutr J. 2014 Jan 17;13(1):6. doi: 10.1186/1475-2891-13-6.

Effect of calcium phosphate and vitamin D3 supplementation on bone remodelling and metabolism of calcium, phosphorus, magnesium and iron.

Trautvetter U, Neef N, Leiterer M, Kiehntopf M, Kratzsch J, Jahreis G.
Author information

Abstract

BACKGROUND:
The aim of the present study was to determine the effect of calcium phosphate and/or vitamin D3 on bone and mineral metabolism.

METHODS:
Sixty omnivorous healthy subjects participated in the double-blind, placebo-controlled parallel designed study. Supplements were tricalcium phosphate (CaP) and cholecalciferol (vitamin D3). At the beginning of the study (baseline), all subjects documented their normal nutritional habits in a dietary record for three successive days. After baseline, subjects were allocated to three intervention groups: CaP (additional 1 g calcium/d), vitamin D3 (additional 10 μg/d) and CaP + vitamin D3. In the first two weeks, all groups consumed placebo bread, and afterwards, for eight weeks, the test bread according to the intervention group. In the last week of each study period (baseline, placebo, after four and eight weeks of intervention), a faecal (three days) and a urine (24 h) collection and a fasting blood sampling took place. Calcium, phosphorus, magnesium and iron were determined in faeces, urine and blood. Bone formation and resorption markers were analysed in blood and urine.

RESULTS:
After four and eight weeks, CaP and CaP + vitamin D3 supplementations increased faecal excretion of calcium and phosphorus significantly compared to placebo. Due to the vitamin D3 supplementations (vitamin D3, CaP + vitamin D3), the plasma 25-(OH)D concentration significantly increased after eight weeks compared to placebo. The additional application of CaP led to a significant increase of the 25-(OH)D concentration already after four weeks. Bone resorption and bone formation markers were not influenced by any intervention.

CONCLUSIONS:
Supplementation with daily 10 μg vitamin D3 significantly increases plasma 25-(OH)D concentration. The combination with daily 1 g calcium (as CaP) has a further increasing effect on the 25-(OH)D concentration. Both CaP alone and in combination with vitamin D3 have no beneficial effect on bone remodelling markers and on the metabolism of calcium, phosphorus, magnesium and iron.

TRIAL REGISTRATION:
NCT01297023. PMID: 24438153

PHARMACOLOGY

Cortical statins and inflammation

Neurobiol Dis. 2013 Dec 9;63C:141-154. doi: 10.1016/j.nbd.2013.11.022.

Cortistatin attenuates inflammatory pain via spinal and peripheral actions.

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Author information

Abstract

Clinical pain, as a consequence of inflammation or injury of peripheral organs (inflammatory pain) or nerve injury (neuropathic pain), represents a serious public health issue. Treatment of pain-related suffering requires knowledge of how pain signals are initially interpreted and subsequently transmitted and perpetuated. To limit duration and intensity of pain, inhibitory signals participate in pain perception. Cortistatin is a cyclic-neuropeptide that exerts potent inhibitory actions on cortical neurons and immune cells.

Here, we found that cortistatin is a natural analgesic component of the peripheral nociceptive system produced by peptidergic nociceptive neurons of the dorsal root ganglia in response to inflammatory and noxious stimuli. Moreover, cortistatin is produced by GABAergic interneurons of deep layers of dorsal horn of spinal cord. By using cortistatin-deficient mice, we demonstrated that endogenous cortistatin critically tunes pain perception in physiological and pathological states. Furthermore, peripheral and spinal injection of cortistatin potently reduced nocifensive behavior, heat hyperalgesia and tactile allodynia in experimental models of clinical pain evoked by chronic inflammation, surgery and arthritis.

The analgesic effects of cortistatin were independent of its anti-inflammatory activity and directly exerted on peripheral and central nociceptive terminals via Gαi-coupled somatostatin-receptors (mainly sstr2) and blocking intracellular signaling that drives neuronal plasticity including protein kinase A-, calcium- and Akt/ERK-mediated release of nociceptive peptides. Moreover, cortistatin could modulate, through its binding to ghrelin-receptor (GHSR1), pain-induced sensitization of secondary neurons in spinal cord. Therefore, cortistatin emerges as an anti-inflammatory factor with potent analgesic effects that offers a new approach to clinical pain therapy, especially in inflammatory states.

KEYWORDS: Allodynia, Dorsal root ganglia, Inflammatory pain, Neuropeptide, Nociceptor, Spinal cord PMID: 24333694

ELECTROTHERAPY

Infrared

J Bodyw Mov Ther. 2014 Jan;18(1):75-81. doi: 10.1016/j.jbmt.2013.05.014. Epub 2013 Jun 4.

Effect of therapeutic infra-red in patients with non-specific low back pain: A pilot study.

Ansari NN1, Naghdi S2, Naseri N2, Entezary E2, Irani S2, Jalaie S2, Hasson S3.
Author information

Abstract

The purpose of this study was to investigate the effect of infra-red (IR) in patients with chronic non-specific low back pain (NSLBP). Ten patients with NSLBP (5 men and 5 women) and disease duration of 21.7 ± 11.50 months participated in this pilot study. Patients had a mean age of 36.40 ± 10.11 years (range = 25-55). Patients were treated with infra-red (IR) for 10 sessions, each for 15 min, 3 days per week, for a period of 4 weeks. Outcome measures were the Numerical Rating Scale (NRS), the Functional Rating Index (FRI), the Modified-Modified Schober Test (MMST), and the Biering-Sorensen test to assess pain severity, disability, lumbar flexion and extension range of motion (ROM), and back extensor endurance, respectively. Data were collected at: baseline - study entry (T0); end of 5th treatment session after 2 weeks (T1); and end of the treatment after 4 weeks (T2). The results of the ANOVA demonstrated a statistically significant main effect of IR on all outcomes of pain, function, lumbar flexion-extension ROM, and back extensor endurance. The treatment effect sizes ranged from large to small.

IR was effective in improving pain, function, lumbar ROM, and back extensor endurance in a sample of patients with NSLBP. Treatment effect sizes ranged from large to small indicating clinically relevant improvements primarily in pain and function for patients with NSLBP.

KEYWORDS: Infra-red, Low back pain, Physiotherapy, Superficial heat PMID: 24411153