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LUMBAR SPINE

Communications impact

Ann Fam Med. 2013 Nov-Dec;11(6):527-34. doi: 10.1370/afm.1518.

The enduring impact of what clinicians say to people with low back pain.

Darlow B, Dowell A, Baxter GD, Mathieson F, Perry M, Dean S.

Abstract

PURPOSE:

The purpose of this study was to explore the formation and impact of attitudes and beliefs among people experiencing acute and chronic low back pain.

METHODS:

Semistructured qualitative interviews were conducted with 12 participants with acute low back pain (less than 6 weeks' duration) and 11 participants with chronic low back pain (more than 3 months' duration) from 1 geographical region within New Zealand. Data were analyzed using an Interpretive Description framework.

RESULTS:

Participants' underlying beliefs about low back pain were influenced by a range of sources. Participants experiencing acute low back pain faced considerable uncertainty and consequently sought more information and understanding. Although participants searched the Internet and looked to family and friends, health care professionals had the strongest influence upon their attitudes and beliefs. Clinicians influenced their patients' understanding of the source and meaning of symptoms, as well as their prognostic expectations. Such information and advice could continue to influence the beliefs of patients for many years. Many messages from clinicians were interpreted as meaning the back needed to be protected. These messages could result in increased vigilance, worry, guilt when adherence was inadequate, or frustration when protection strategies failed. Clinicians could also provide reassurance, which increased confidence, and advice, which positively influenced the approach to movement and activity.

CONCLUSIONS:

Health care professionals have a considerable and enduring influence upon the attitudes and beliefs of people with low back pain. It is important that this opportunity is used to positively influence attitudes and beliefs.

KEYWORDS: attitude, attitudes, health knowledge, health personnel, low back pain, patients, physician-patient relations, practice PMID: 24218376

Endometriosis of the spine

European Spine Journal
February 2014

Low back pain tied to spinal endometriosis

Zhao Dongxu, Yin Fei, Xiao Xing, Zhang Bo-Yin, Zhu Qingsan

Abstract

Study design

Case report.

Objective

We present a case of endometriosis of lumbar vertebrae. The literatures are reviewed with endometriosis of spine.

Summary of background data

Endometriosis is a common condition, which is defined as endometrial tissue lying outside the endometrial cavity. It is usually found within the peritoneal cavity, predominantly within the pelvis, commonly on the uterosacral ligaments. It can also be found in other sites such as umbilicus, abdominal scars, nasal passages and pleural cavity. But it is very rarely seen in the spine, with no report of endometriosis found in the lumbar vertebrae.

Method

A 33-year-old woman presented with severe low back pain. She had the low back pain periodically for 3 years, and the pain was associated with menstruation. Radiographs showed a lesion in the posterior L3 body. After surgery, tissue biopsy indicated the presence of endometrial tissue in the lesion and thus confirmed endometriosis.

Results

Most cases of spine endometriosis that have been reported are usually found inside spinal canal, endorachis or spinal cord. But spinal vertebrae can also be involved in endometriosis.

Conclusions

Although endometriosis is a rare possible cause of periodical low back pain in women of childbearing age, we suggest that if a woman suffering from periodical low back pain is encountered, do not ignore the possibility of endometriosis in the spine.

Social aspects of LBP

BMC Musculoskelet Disord. 2014 Feb 21;15(1):50.

A systematic review and meta-synthesis of the impact of low back pain on people's lives.

Froud R, Patterson S, Eldridge S, Seale C, Pincus T, Rajendran D, Fossum C, Underwood M.

Abstract

BACKGROUND:

Low back pain (LBP) is a common and costly problem that many interpret within a biopsychosocial model. There is renewed concern that core-sets of outcome measures do not capture what is important. To inform debate about the coverage of back pain outcome measure core-sets, and to suggest areas worthy of exploration within healthcare consultations, we have synthesised the qualitative literature on the impact of low back pain has on people's lives.

METHODS:

Two reviewers searched CINAHL, Embase, PsycINFO, PEDro, and Medline, identifying qualitative studies of people's experiences of non-specific LBP. Abstracted data were thematic coded and synthesised using a meta-ethnographic, and a meta-narrative approach.

RESULTS:

We included 49 papers describing 42 studies. Patients are concerned with engagement in meaningful activities; but they also want to be believed and have their experiences and identity, as someone 'doing battle' with pain, validated. Patients seek diagnosis, treatment, and cure, but also reassurance of the absence of pathology. Some struggle to meet social expectations and obligations. When these are achieved, the credibility of their pain/disability claims can be jeopardised. Others withdraw, fearful of disapproval, or unable or unwilling to accommodate social demands. Patients generally seek to regain their pre-pain levels of health, and physical and emotional stability. After time, this can be perceived to become unrealistic and some adjust their expectations accordingly.

CONCLUSIONS:

The social component of the biopsychosocial model is not well represented in current core-sets of outcome measures. Clinicians should appreciate that the broader impact of low back pain includes social factors; this may be crucial to improving patients' experiences of health care. Researchers should consider social factors to help develop a portfolio of more relevant outcome measures.

PMID: 24559519

Spondy's and imbalances

J Back Musculoskelet Rehabil. 2014 Feb 20.

Association of strength, muscle balance, and atrophy with pain and function in patients with degenerative spondylolisthesis.

Nava-Bringas TI1, Ramírez-Mora I2, Coronado-Zarco R1, Macías-Hernández SI1, Cruz-Medina E1, Arellano-Hernández A1, Hern Ndez-López M1, León-Hernández SR3.

Abstract

PURPOSE:

To analyze the relationship of strength, muscular balance, and atrophy with pain and function in patients with degenerative spondylolisthesis.

STUDY DESIGN: Transversal, descriptive, and observational.

PATIENTS AND METHODS: Institutional review board approval was obtained for this study. Twenty six patients ages 50 years and older, with degenerative spondylolisthesis at L4-L5. Measurements included Pain Visual Analogue Scale scores (VAS), Oswestry Disability Index scores (ODI), and isokinetic trunk testing; assessment of multifidus atrophy and spinal stenosis was performed by Magnetic Resonance Imaging (MRI).

STATISTICS: Statistical analysis was performed using SPSS version 17.0 software for Windows. Pearson's correlation was used to ascertain the correlation between variables. ANOVA with analysis of covariance was used to determine the correlation between the remainder variables. Significance was set at $p < 0.05$.

RESULTS: Of the 26 patients studied, with an average age of 60.23 ± 7.6 years, 20 had grade I spondylolisthesis and 6 were grade II. Correlation between the ODI scores and spondylolisthesis grading was significant ($r=0.576$, $p=0.005$); correlation between agonist/antagonist ratio in the isokinetic test (predominant extensor muscles over flexors) with the ODI scores was also significant ($r=0.446$, $p=0.02$), regardless of spinal stenosis. No correlation was found between functionality and pain with strength or multifidus atrophy.

CONCLUSION: Muscle trunk imbalance with predominance of extensor over flexor muscles is associated with functional disability. Rehabilitation programs should be designed to improve muscle balance rather than muscle strength alone.

KEYWORDS: Multifidus atrophy, degenerative spondylolisthesis, functionality, pain, strength
PMID: 2456178

Impact of pain meds

Eur Spine J. 2014 Feb 15.

Do analgesics improve functioning in patients with chronic low back pain? An explorative triple-blinded RCT.

Schiphorst Preuper HR, Geertzen JH, van Wijhe M, Boonstra AM, Molmans BH, Dijkstra PU, Reneman MF.

Abstract

PURPOSE:

Treatment of patients with chronic low back pain (CLBP) aims to reduce disability, improve functional capacity, and participation. Time contingent prescription of analgesics is a treatment modality in CLBP. The impact of analgesics on functional capacity is unknown. Aim of the study was to explore the effect of analgesics on functioning measured by functional capacity evaluation, and self-reported disability in patients with CLBP.

METHODS:

Explorative Randomized Placebo-Controlled Clinical Trial was performed in an outpatient pain rehabilitation setting on patients waiting for rehabilitation. Included patients had low back pain lasting >3 months, visual analogue scale worst pain ≥ 4.0 cm, and age >18 years. Outcome measures before (T0) and after treatment (T1): functional capacity, pain intensity, Roland Morris Disability Questionnaire. T1: global perceived pain relief. Patient characteristics and psychological questionnaires were assessed. Fifty patients were included in this study and were randomly assigned to 2 weeks treatment or placebo. Treatment: acetaminophen/tramadol 325 mg/37.5 mg per capsule. Dose: maximum acetaminophen 1,950 mg and tramadol 225 mg per day; treatment and placebo titrated identically. Compliance and side-effects were monitored. Treatment effects between groups over time were compared.

RESULTS:

One patient (treatment group) was lost to follow-up. Forty-nine patients remained in the study. Treatment effects in primary outcomes did not differ significantly between groups. A subgroup of 10 (42 %) patients (treatment group) reported global pain relief (responders) who reduced self-reported disability ($p < 0.05$). Responders had significantly lower catastrophizing scores.

CONCLUSION:

Overall treatment effects were small and non-significant. A subgroup, however, reported improved functioning as a result of treatment. Responders had lower catastrophizing scores.

PMID: 24526247

PT's and medications for LBP

Mil Med. 2014 Feb;179(2):162-8. doi: 10.7205/MILMED-D-13-00099.

Physical Therapist vs. Family Practitioner Knowledge of Simple Low Back Pain Management in the U.S. Air Force.

Ross MD1, Childs JD2, Middel C2, Kujawa J2, Brown D2, Corrigan M2, Parsons N2.

Abstract

BACKGROUND:

The purpose of this study was to compare knowledge in managing low back pain (LBP) between physical therapists and family practice physicians.

METHODS:

Fifty-four physical therapists and 130 family practice physicians currently serving in the U.S. Air Force completed standardized examinations assessing knowledge, attitudes, the usefulness of clinical practice guidelines, and management strategies for patients with LBP. Beliefs of physical therapists and family practice physicians about LBP were compared using relative risks and independent t tests. Scores related to knowledge, attitudes, and the usefulness of clinical practice guidelines were generally similar between the groups.

RESULTS:

Physical therapists were more likely to recommend the correct drug treatments for patients with acute LBP compared to family practice physicians (85.2% vs. 68.5%; relative risk: 1.24 [95% confidence interval: 1.06-1.46]) and believe that patient encouragement and explanation is important (75.9% vs. 56.2%; relative risk: 1.35 [95% confidence interval: 1.09-1.67]). In addition, physical therapists showed significantly greater knowledge regarding optimal management strategies for patients with LBP compared to family practice physicians.

CONCLUSIONS:

The results of this study may have implications for health policy decisions regarding the utilization of physical therapists to provide care for patients with LBP without a referral.

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TL fascia

J Anat. 2012 Dec;221(6):568-76. doi: 10.1111/j.1469-7580.2012.01517.x. Epub 2012 May 15.

A description of the lumbar interfascial triangle and its relation with the lateral raphe: anatomical constituents of load transfer through the lateral margin of the thoracolumbar fascia.

Schuenke MD1, Vleeming A, Van Hoof T, Willard FH.

Abstract

Movement and stability of the lumbosacral region is contingent on the balance of forces distributed through the myofascial planes associated with the thoracolumbar fascia (TLF). This structure is located at the common intersection of several extremity muscles (e.g. latissimus dorsi and gluteus maximus), as well as hypaxial (e.g. ventral trunk muscles) and epaxial (paraspinal) muscles. The mechanical properties of the fascial constituents establish the parameters guiding the dynamic interaction of muscle groups that stabilize the lumbosacral spine. Understanding the construction of this complex myofascial junction is fundamental to biomechanical analysis and implementation of effective rehabilitation in individuals with low back and pelvic girdle pain. Therefore, the main objectives of this study were to describe the anatomy of the lateral margin of the TLF, and specifically the interface between the fascial sheath surrounding the paraspinal muscles and the aponeurosis of the transversus abdominis (TA) and internal oblique (IO) muscles. The lateral margin of the TLF was exposed via serial reduction dissections from anterior and posterior approaches. Axial sections (cadaveric and magnetic resonance imaging) were examined to characterize the region between the TA and IO aponeurosis and the paraspinal muscles. It is confirmed that the paraspinal muscles are enveloped by a continuous paraspinal retinacular sheath (PRS), formed by the deep lamina of the posterior layer of the TLF. The PRS extends from the spinous process to transverse process, and is distinct from both the superficial lamina of the posterior layer and middle layer of the TLF. As the aponeurosis approaches the lateral border of the PRS, it appears to separate into two distinct laminae, which join the anterior and posterior walls of the PRS. This configuration creates a previously undescribed fat-filled lumbar interfascial triangle situated along the lateral border of the paraspinal muscles from the 12th rib to the iliac crest. This triangle results in the unification of different fascial sheaths along the lateral border of the TLF, creating a ridged-union of dense connective tissue that has been termed the lateral raphe (Spine, 9,1984, 163). This triangle may function in the distribution of laterally mediated tension to balance different viscoelastic moduli, along either the middle or posterior layers of the TLF.

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Pelvic pain hyperalgesia

Pain. 2012 Nov;153(11):2233-40. doi: 10.1016/j.pain.2012.07.013. Epub 2012 Aug 22.

Experimental pelvic pain facilitates pain provocation tests and causes regional hyperalgesia.

Palsson TS1, Graven-Nielsen T.

Author information

Abstract

The extra-articular sacroiliac joint (SIJ) structure is a potential source for low back and pelvic pain. This study hypothesised that experimental pain induced in a superficial pelvic ligament causes (1) hyperalgesia to pressure, (2) distinct pain referral, and (3) an increased frequency of positive pain provocation tests of the SIJ complex. Thirty healthy subjects (15 females) participated in this study designed as a randomised crossover trial. Pain was induced in the long posterior sacroiliac ligament by injection of hypertonic saline, with the contralateral ligament injected with isotonic saline as control. Pain intensity was assessed on an electronic visual analogue scale (VAS). Pressure pain thresholds (PPTs) and pain provocation tests were assessed on 3 occasions: at baseline, after injection, and when pain had subsided. PPT sites were located bilaterally at the injection site, lateral to spinous processes of S2 and L5, and at the gluteus medius and gastrocnemius muscles. Hypertonic saline caused significantly higher VAS scores and more extended pain referral than isotonic saline ($P < 0.001$). PPTs at the injection site and lateral to S2 were significantly reduced after hypertonic saline compared with baseline and isotonic saline ($P < 0.002$). Significantly more subjects had positive pain provocation tests after hypertonic (67% of subjects) compared with isotonic saline (20%; $P < 0.001$). These data demonstrate that the extra-articular SIJ structure accommodates nociceptors that are capable of inducing pain referral and regional hyperalgesia sensitive to manual pain provocation tests similar to what previously have been found in pelvic girdle pain patients.

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PMID: 22921262

Risk factors first time LBP

Spine J. 2014 Jan 22. pii: S1529-9430(14)00103-X. doi: 10.1016/j.spinee.2014.01.026.

Incidence and Risk Factors for First-Time Incident Low Back Pain: A Systematic Review and Meta-Analysis.

Taylor JB1, Goode AP2, George SZ3, Cook CE4.

Abstract

BACKGROUND CONTEXT: Great effort has been made toward limiting low back pain (LBP). Recent focus has included factors involved with secondary and tertiary prevention, with less attention given to primary prevention.

PURPOSE: This review provided a current estimate of the incidence of LBP and risk factors associated with either first-time LBP or transition to LBP from a baseline of a pain-free state.

STUDY DESIGN: A systematic review and meta-analyses were performed according to PRISMA guidelines.

PATIENT SAMPLE: Studies included subjects 18 years of age or older, from longitudinal, observational, cohort designs that included baseline risk factors to an outcome of either first-time LBP or transition to LBP from a baseline of a pain-free state.

OUTCOME MEASURES: Risk factors and incidence rates were reported using descriptive analysis and the PRISMA guidelines.

METHODS: Electronic search strategies in PubMed, CINAHL/SPORTDiscus, and Cochrane Central Register of Controlled Trials were combined with a hand search to identify articles for inclusion. Studies were classified based on the population studied (community vs. occupational based) and type of LBP outcome (first-ever vs. transition from a baseline pain-free state). No funding was used in this study. The authors claim no conflicts of interest, though APG has received funding from the Agency for Health Care Research and Quality and SZG has received funding from the National Institutes of Health and Brooks Health.

RESULTS: A total of 41 studies were included for review. Meta-analytic incidence rates for first-time LBP and transition to pain from a pain-free state were similar ($\square 25\%$) regardless of community or occupational populations. Risk factors for first-time LBP or transition to LBP from a baseline of a pain-free state were both psychosocial- and physically-related. No consistent risk factor emerged as predictive of first-time LBP, though prior LBP was a consistent predictor of future incident LBP. Significant heterogeneity was found across studies in most models, which limits these findings.

CONCLUSIONS: The results of this study suggest that incidence of LBP is similar in community and occupational settings regardless of LBP definition. There were multiple, diverse physical and psychosocial risk factors for first-time LBP. A previous history of LBP was the most consistent risk factor for transition to LBP from a baseline of a pain-free state.

Copyright © 2014 Elsevier Inc. All rights reserved. **KEYWORDS:** Incidence, Low Back Pain, Predictive Validity, Risk Factors

Activity distribution in LBP

Pain. 2014 Feb 3. pii: S0304-3959(14)00048-7. doi: 10.1016/j.pain.2014.01.027.

Reduced task-induced variations in the distribution of activity across back muscle regions in individuals with low back pain.

Falla D1, Gizzi L2, Tschapek M3, Erlenwein J3, Petzke F3.

Author information

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3Pain Clinic, Center for Anesthesiology, Emergency and Intensive Care Medicine, University Hospital Göttingen, Göttingen, Germany.

Abstract

This study investigated change in the distribution of lumbar erector spinae muscle activity and pressure pain sensitivity across the low back in individuals with low back pain (LBP) and healthy controls. Surface electromyographic (EMG) signals were recorded from multiple locations over the lumbar erector spinae muscle with a 13×5 grid of electrodes from 19 people with chronic non-specific LBP and 17 control subjects as they performed a repetitive lifting task. The EMG root mean square (RMS) was computed for each location of the grid to form a map of the EMG amplitude distribution. Pressure pain thresholds (PPT) were recorded before and after the lifting task over a similar area of the back. For the control subjects, the EMG RMS progressively increased more in the caudal region of the lumbar erector spinae during the repetitive task resulting in a shift in the distribution of muscle activity. In contrast, the distribution of muscle activity remained unaltered in the LBP group despite an overall increase in EMG amplitude. PPT was lower in the LBP group after completion of the repetitive task compared to baseline (average across all locations: pre: 268.0±165.9kPa; post: 242.0±166.7kPa) whereas no change in PPT over time was observed for the control group (320.1±162.1kPa; post: 322.0±179.5kPa).

The results demonstrate that LBP alters the normal adaptation of lumbar erector spinae muscle activity to exercise which occurs in the presence of exercise-induced hyperalgesia. Reduced variability of muscle activity may have important implications for the provocation and recurrence of LBP due to repetitive tasks.

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KEYWORDS: Exercise, Low Back Pain, Multichannel EMG, Pressure Pain Threshold PMID: 24502841

Tactile acuity

Man Ther. 2014 Jan 18. pii: S1356-689X(14)00003-4. doi: 10.1016/j.math.2014.01.002.

Lumbar tactile acuity is near identical between sides in healthy pain-free participants.

Wand BM1, Catley MJ2, Luomajoki HA3, O'Sullivan KJ4, Di Pietro F5, O'Connell NE6, Moseley GL2.

Abstract

A growing body of literature suggests that alterations in brain structure and function are a feature of chronic back pain. Tactile acuity is considered a clinical signature of primary somatosensory representation and offers a simple measure of cortical reorganisation. Clinical interpretation of test scores from an individual patient is hampered by variance in published normative values and less than ideal inter-rater reliability. These problems might be mitigated in people with unilateral back pain by using the patient as their own control and comparing tactile acuity at the painful site to performance at the corresponding position on the non-painful side. The first step in exploring this approach is to quantify the normal side-to-side difference in healthy populations. We pooled data from three previous studies that measured lumbar tactile acuity bilaterally in healthy controls using similar protocols. We calculated the mean and variance of the absolute error between sides, the standard error of measurement and the reliable change index (RCI). The mean difference between sides was 3.2 mm (± 5.2) when assessed vertically and 1.9 mm (± 3.2) when assessed horizontally. The standard error of measurement was 4.2 mm when assessed vertically and 2.7 mm when assessed horizontally.

The RCI suggests that differences of greater than 13 mm when assessed horizontally and 17 mm when assessed vertically equate to 95% confidence that a difference truly exists.

Several assumptions related to the application of this approach need to be investigated further.

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KEYWORDS: Body image, Chronic low back pain, Sensory acuity, Two-point discrimination
PMID: 24484671

Anterior pain in LBP

Pain. 2014 Feb 3. pii: S0304-3959(14)00044-X. doi: 10.1016/j.pain.2014.01.023.

Does Anterior Trunk Pain Predict a Different Course of Recovery in Chronic Low back Pain?

Panagopoulos J1, Hancock MJ2, Kongsted A3, Hush J2, Kent P4.

Abstract

Patient characteristics associated with the course and severity of low back pain (LBP) and disability have been the focus of extensive research, however, known characteristics do not explain much of the variance in outcomes. The relationship between anterior trunk pain and LBP has not been explored, though mechanisms for visceral referred pain have been described. Study objectives were: (1) determine prevalence of anterior trunk pain in chronic LBP patients, (2) determine whether anterior trunk pain is associated with increased pain and disability in these patients, and (3) evaluate whether anterior trunk pain predicts the course of pain and disability in these patients. In this study, spinal outpatient department patients mapped the distribution of their pain and patients describing pain in their chest, abdomen or groin were classified with anterior trunk pain. Generalized estimating equations were performed to investigate the relationship between anterior trunk pain and LBP outcomes. A total of 2,974 patients were included and 19.6% of patients reported anterior trunk pain. At all time-points, there were significant differences in absolute pain intensity and disability in those with anterior trunk pain compared with those without. The presence of anterior trunk pain did not affect the clinical course of LBP outcomes. The results of this study suggest that patients who present with LBP and anterior trunk pain have higher pain and disability levels than patients with localised LBP.

Visceral referred pain mechanisms may help explain some of this difference.

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KEYWORDS: Anterior trunk pain, Disability, Low Back Pain, Prognostic Factors, Visceral Pain PMID: 24502844

Strength testing in LBP

J Back Musculoskelet Rehabil. 2014 Feb 20.

Reliability and validity of lumbar and abdominal trunk muscle endurance tests in office workers with nonspecific subacute low back pain.

Del Pozo-Cruz B1, Mocholi MH2, Del Pozo-Cruz J3, Parraca JA2, Adsuar JC2, Gusi N2.

Abstract

BACKGROUND AND OBJECTIVE:

Despite the widespread use of trunk endurance tests, the reliability and validity of these tests in office workers with subacute nonspecific low back pain are unknown.

MATERIALS AND METHODS: This cross-sectional study involved 190 subjects: 30 men and 42 women without low back pain and 47 men and 71 women with low back pain. All subjects underwent timed prone and supine isometric lumbar and abdominal trunk endurance tests that were performed until subjective fatigue occurred. All subjects also completed the Roland Morris and Oswestry self-reported disability questionnaires. A test-retest study (7 days) was conducted with 31 participants with low back pain from the study.

RESULTS: For the abdominal trunk endurance test, males and females with low back pain had mean (SD) values of 62.06 (36.87) and 46.06 (29.28) seconds, respectively, both significantly lower than the asymptomatic workers. For the lumbar test, males and females with low back pain had mean (SD) values of 79.57 (30.66) and 75.49 (28.97) seconds, respectively, again, both significantly lower than the asymptomatic workers. The intraclass correlation coefficients of both tests exceeded 0.90 and the Kappa indices were excellent for both men and women. Receiver-operating curve analyses revealed areas under the curve very close to or exceeding 0.70 for both men and women for both tests.

CONCLUSIONS: The lumbar and abdominal trunk muscle endurance tests appeared to be reliable and valid measures in office workers with subacute low back pain.

KEYWORDS: Backache, lower back pain, monitoring, occupational assessment PMID: 24561788

Exercise and obesity in LBP

Resistance Exercise, Disability, and Pain Catastrophizing in Obese Adults with Back Pain

Vincent, Heather K.; George, Steven Z.; Seay, Amanda N.; Vincent, Kevin R.; Hurley, Robert W.
Published Ahead-of-Print

Medicine and Science in Sports and Exercise, 02/07/2014 Evidence Based Medicine

Vincent HK, et al.

Purpose: The purpose of this study was to compare the effects of two different resistance exercise protocols on self-reported disability, fear avoidance beliefs, pain catastrophizing and back pain symptoms in obese, older adults with low back pain.

Methods: Obese adults (N = 49; 60-85 years) with chronic low back pain (LBP) were randomized into a total body resistance exercise intervention (TOTRX), lumbar extensor exercise intervention (LEXT) or a control group (CON). Main outcomes included perceived disability (Oswestry Disability Index [ODI], Roland Morris Disability Questionnaire [RMDQ]). Psychosocial measures included the Fear Avoidance Beliefs (FAB) survey, Tampa Scale of Kinesiophobia (TSK), Pain Catastrophizing Scale (PCS). LBP severity was measured during three functional tasks: walking, stair climb and chair rise using an 11 point numerical pain rating scale (NRSpain).

Results: The TOTRX group had greater reductions in self-reported disability scores due to back pain (ODI, RMDQ) compared to LEXT ($p < 0.05$). The PCS scores decreased in the TOTRX compared to CON by month four (64.3% vs 4.8%, $p < 0.05$). Pain severity during chair rise activity, and walking pain severity was decreased in both LEXT and TOTRX relative to the CON group.

Conclusions: Greater reductions in perceived disability due to LBP can be achieved with TOTRX compared to LEXT. Pain catastrophizing and pain severity decreased most with TOTRX. The positive change in psychological outlook may assist obese, older adults with chronic back pain re-consider the harmfulness of the pain and facilitate regular participation in other exercise programs.

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Disc

Changes

Spine J. 2014 Mar 1;14(3):469-78. doi: 10.1016/j.spinee.2013.11.018. Epub 2013 Nov 19.

Aging changes in lumbar discs and vertebrae and their interaction: a 15-year follow-up study.

Videman T1, Battié MC2, Gibbons LE3, Gill K4.

Abstract

BACKGROUND CONTEXT:

Many studies have focused on either the intervertebral disc as a culprit in back pain problems, or the vertebral body, but very few studies have examined both structures and their relationship.

PURPOSE:

To measure the concordant changes in morphology of the discs and vertebrae during 5-, 10-, and 15-year follow-ups.

STUDY DESIGN:

Longitudinal study.

PATIENT SAMPLE:

Among a general population sample of 232 men that had been scanned in 1992-1993, 105 men were reexamined in 1997-1998 and 2007-2008. Mean age at the 15-year follow-up was 63 years. A confirmatory sample with 10 years follow-up was also included.

METHODS:

Scanners (1.5 Tesla) with surface coils were used at baseline and follow-up. Image analyzing software was used to measure distances and areas of interest of midsagittal and midaxial spine images.

RESULTS:

The disc heights decreased at 5 years by 3.4% (0.4 mm) and 3.3% (0.4 mm) and at 15 years by 8.7% (1.0 mm) and 11.3% (1.3 mm) in the upper and lower discs, respectively ($p < .001$). Although not clear after 5 years, vertebra heights increased in mean by 3.1% (0.8 mm) in the upper lumbar levels and by 4.7% (1.1 mm) in the lower vertebrae after 15 years ($p < .001$). Vertebra height increases were associated with disc narrowing ($p = .001$). The mean annual shortening of the lumbar spine L1-S1 block was 0.13 mm/y, which was in line with the mean standing height that decreased little (174.7 cm at baseline and 174.4 cm at the follow-up).

CONCLUSIONS:

Discs and vertebrae degenerate or remodel in concert: decreases in disc height appear to be compensated, in part, by accompanying increases in adjacent vertebra heights. The mechanism behind this novel finding and its implications require further study.

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KEYWORDS: Disc degeneration, End plate, Lumbar spine, MRI, Pathology, Vertebra PMID: 24262855

End plate innervation

Spine J. 2014 Mar 1;14(3):513-21. doi: 10.1016/j.spinee.2013.06.075. Epub 2013 Oct 18.

Innervation of pathologies in the lumbar vertebral end plate and intervertebral disc.

Fields AJ1, Liebenberg EC1, Lotz JC2.

Author information

Abstract

BACKGROUND CONTEXT:

Magnetic resonance imaging (MRI) has limited diagnostic value for chronic low back pain because of the unclear relationship between any anatomic abnormalities on MRI and pain reported by the patient. Assessing the innervation of end plate and disc pathologies-and determining the relationship between these pathologies and any abnormalities seen on MRI-could clarify the sources of back pain and help identify abnormalities with enhanced diagnostic value.

PURPOSE:

To quantify innervation in the vertebral end plate and intervertebral disc and to relate variation in innervation to the presence of pathologic features observed by histology and conventional MRI.

STUDY DESIGN/SETTING:

A cross-sectional histology and imaging study of vertebral end plates and intervertebral discs harvested from human cadaver spines.

METHODS:

We collected 92 end plates and 46 intervertebral discs from seven cadaver spines (ages 51-67 years). Before dissection, the spines were scanned with MRI to grade for Modic changes and high-intensity zones (HIZ). Standard immunohistochemical techniques were used to localize the general nerve marker protein gene product 9.5. We quantified innervation in the following pathologies: fibrovascular end-plate marrow, fatty end-plate marrow, end-plate defects, and annular tears.

RESULTS:

Nerves were present in the majority of end plates with fibrovascular marrow, fatty marrow, and defects. Nerve density was significantly higher in fibrovascular end-plate marrow than in normal end-plate marrow ($p < .001$). Of the end plates with fibrovascular and fatty marrow, less than 40% were Modic on MRI. Innervated marrow pathologies collocated with more than 75% of the end plate defects; hence, innervation was significantly higher in end plate defects than in normal end plates ($p < .0001$). In the disc, nerves were observed in only 35% of the annular tears; in particular, innervation in radial tears tended to be higher than in normal discs ($p = .07$). Of the discs with radial tears, less than 13% had HIZ on T2 MRI. Innervation was significantly less in radial tears than in fibrovascular end-plate marrow ($p = .05$) and end-plate defects ($p = .02$).

CONCLUSIONS:

These findings indicate that vertebral end-plate pathologies are more innervated than intervertebral disc pathologies and that many innervated end-plate pathologies are not detectable on MRI. Taken together, these findings suggest that improved visualization of end-plate pathologies could enhance the diagnostic value of MRI for chronic low back pain.

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KEYWORDS: End plate, Innervation, Intervertebral disc, Low back pain, Modic change PMID: 24139753

Variation

Spine J. 2014 Mar 1;14(3):522-30. doi: 10.1016/j.spinee.2013.06.089. Epub 2013 Nov 15.

Intervertebral discs from spinal nondeformity and deformity patients have different mechanical and matrix properties.

Cheng KK1, Berven SH1, Hu SS1, Lotz JC2.

Abstract

BACKGROUND CONTEXT:

It is well-established that disc mechanical properties degrade with degeneration. However, prior studies utilized cadaveric tissues from donors with undefined back pain history. Disc degeneration may present with pain at the affected motion segment, or it may be present in the absence of back pain. The mechanical properties and matrix quantity of discs removed and diagnosed for degeneration with patient chronic pain may be distinct from those with other diagnoses, such as spinal deformity.

PURPOSE:

To test the hypothesis that discs from nondeformity segments have inferior mechanical properties than deformity discs owing to differences in matrix quality.

STUDY DESIGN/SETTING:

In vitro study comparing the mechanical and matrix properties of discs from surgery patients with spinal nondeformity and deformity.

METHODS:

We analyzed nucleus and annulus samples (8-11 specimens per group) from surgical discectomy patients as part of a fusion or disc replacement procedure. Tissues were divided into two cohorts: nondeformity and deformity. Dynamic indentation tests were used to determine energy dissipation, indentation modulus, and viscoelasticity. Tissue hydration at a physiologic pressure was assessed by equilibrium dialysis. Proteoglycan, collagen, and collagen cross-link content were quantified. Matrix structure was assessed by histology.

RESULTS:

We observed that energy dissipation was significantly higher in the nondeformity nucleus than in the deformity nucleus. Equilibrium dialysis experiments showed that annulus swelling was significantly lower in the nondeformity group. Consistent with this, we observed that the nondeformity annulus had lower proteoglycan and higher collagen contents.

CONCLUSIONS:

Our data suggest that discs from nondeformity discs have subtle differences in mechanical properties compared with deformity discs. These differences were partially explained by matrix biochemical composition for the annulus, but not for the nucleus. The results of this study suggest that compromised matrix quality and diminished mechanical properties are features that potentially accompany discs of patients undergoing segmental fusion or disc replacement for disc degeneration and chronic back pain. These features have previously been implicated in pain via instability or reduced motion segment stiffness.

Copyright © 2014 Elsevier Inc. All rights reserved. **KEYWORDS:** Back pain, Collagen, Equilibrium dialysis, Indentation testing, Intervertebral disc degeneration, Proteoglycan PMID: 24246750

High intensity zone

Spine J. 2014 Mar 1;14(3):391-6. doi: 10.1016/j.spinee.2013.06.078. Epub 2013 Oct 17.

Quantitative estimation of the high-intensity zone in the lumbar spine: comparison between the symptomatic and asymptomatic population.

Liu C1, Cai HX2, Zhang JF2, Ma JJ2, Lu YJ2, Fan SW3.

Abstract

BACKGROUND CONTEXT:

The high-intensity zone (HIZ) on magnetic resonance imaging (MRI) has been studied for more than 20 years, but its diagnostic value in low back pain (LBP) is limited by the high incidence in asymptomatic subjects. Little effort has been made to improve the objective assessment of HIZ.

PURPOSE:

To develop quantitative measurements for HIZ and estimate intra- and interobserver reliability and to clarify different signal intensity of HIZ in patients with or without LBP.

STUDY DESIGN:

A measurement reliability and prospective comparative study.

PATIENT SAMPLE:

A consecutive series of patients with LBP between June 2010 and May 2011 (group A) and a successive series of asymptomatic controls during the same period (group B).

OUTCOME MEASURES:

Incidence of HIZ; quantitative measures, including area of disc, area and signal intensity of HIZ, and magnetic resonance imaging index; and intraclass correlation coefficients (ICCs) for intra- and interobserver reliability.

METHODS:

On the basis of HIZ criteria, a series of quantitative dimension and signal intensity measures was developed for assessing HIZ. Two experienced spine surgeons traced the region of interest twice within 4 weeks for assessment of the intra- and interobserver reliability. The quantitative variables were compared between groups A and B.

RESULTS:

There were 72 patients with LBP and 79 asymptomatic controls enrolling in this study. The prevalence of HIZ in group A and group B was 45.8% and 20.2%, respectively. The intraobserver agreement was excellent for the quantitative measures (ICC=0.838-0.977) as well as interobserver reliability (ICC=0.809-0.935). The mean signal of HIZ in group A was significantly brighter than in group B ($57.55 \pm 14.04\%$ vs. $45.61 \pm 7.22\%$, $p=.000$). There was no statistical difference of area of disc and HIZ between the two groups. The magnetic resonance imaging index was found to be higher in group A when compared with group B (3.94 ± 1.71 vs. 3.06 ± 1.50), but with a p value of .050.

CONCLUSIONS:

A series of quantitative measurements for HIZ was established and demonstrated excellent intra- and interobserver reliability. The signal intensity of HIZ was different in patients with or without LBP, and significant brighter signal was observed in symptomatic subjects.

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KEYWORDS: Disc degeneration, High intensity zone, Magnetic resonance imaging, Quantitative measurement, Reliability PMID: 24139862

LBP/INJECTIONS

Stenosis/injections

Pain Med. 2014 Jan 16. doi: 10.1111/pme.12348.

Correlation Between Severity of Lumbar Spinal Stenosis and Lumbar Epidural Steroid Injection.

Park CH, Lee SH.

Abstract

OBJECTIVE:

Lumbar spinal stenosis (LSS) is a narrowing of the spinal canal that causes mechanical compression of the spinal nerve roots. The compression of these nerve roots can cause leg pain, as well as neurogenic claudication. Lumbar epidural steroid injections have commonly been used in patients with LSS. The aim of our study was to determine the relationship between the severity of LSS using a grading system (grade 1 = mild stenosis with separation of all cauda equina; grade 2 = moderate stenosis with some cauda equina aggregated; grade 3 = severe stenosis with none of the cauda equina separated) and the subject's response to computed tomography-guided lumbar epidural steroid injection (CTG-LESI) and to evaluate the short-term effectiveness.

METHODS:

Forty-seven consecutive patients with degenerative LSS were enrolled in this prospective study. All subjects underwent lumbar spine magnetic resonance imaging. Two radiologists independently graded lumbar central canal stenosis based on T2-weighted axial images. All CTG-LESI were performed in the procedure room. Outcome measures were obtained using the 5-point patient's satisfaction scale at 2 and 8 weeks post-treatment. To evaluate the outcome, we divided the patients into two groups according to their response to the treatment.

RESULTS:

Improvement (including reports of slightly improved, much improved, and no pain) was observed in 37 patients (78.7%) at 2 weeks and 36 patients (77.6%) at 8 weeks after the procedure. There was no statistically significant correlation between pain relief and age.

CONCLUSIONS:

The grade of LSS appears to have no effect on the degree of pain relief associated with CTG-LESI. However, CTG-LESI seems to provide effective short-term pain relief due to LSS.

Wiley Periodicals, Inc. **KEYWORDS:** Epidural (Injection Space), Pain Management PMID: 24433526

PELVIC GIRDLE

Coccyx pain

J Back Musculoskelet Rehabil. 2014 Feb 20.

Coccygodynia treated by pulsed radio frequency treatment to the Ganglion of Impar: A case series.

Gopal H, Mc Crory C.

Abstract

BACKGROUND:

Chronic coccygodynia accounts for 1% of all back pain referrals and very difficult to treat with an enormous functional deficit.

OBJECTIVE:

The purpose of this case series was to examine the effectiveness of pulsed radiofrequency treatment to Ganglion of Impar in chronic coccygodynia patients unresponsive to comprehensive medical management. **METHODS:** Coccygodynia is defined as pain in and around the coccyx [1,2]. This retrospective review of twenty patients with a clinical diagnosis of coccygodynia and failed medical management treated with pulsed radio frequency applied to the Ganglion of Impar between January 2009 to December 2011 was carried out. A successful outcome was defined as > 50% improvement in pain on the visual analogue scale at 6 and 12 months follow-up.

RESULTS:

The application of pulsed radio frequency to the Ganglion of Impar was successful in fifteen (75%) patients and their mean pre treatment visual analogue scale score of 6.53 was reduced to 0.93 at 6 and 12 months follow up. In five (25%) patients the treatment was not successful and there was no difference between mean pre and post treatment visual analogue scale scores.

CONCLUSION:

We conclude that pulsed radio frequency treatment of the Ganglion of Impar should be considered when coccygodynia has proven resistant to medical management.

KEYWORDS: Ganglion of Impar, Pulsed radio frequency, coccygodynia PMID: 24561782

Innominate motions

Man Ther. 2009 Oct;14(5):514-9. doi: 10.1016/j.math.2008.09.004. Epub 2008 Nov 22.

Sex differences in the pattern of innominate motion during passive hip abduction and external rotation.

Bussey MD1, Milosavljevic S, Bell ML.

Abstract

The objective of the study was to evaluate sex differences in the pattern of innominate motion about the sacroiliac joint (SIJ) during hip movement. Although the magnitude of intrinsic SIJ motion is influenced by joint congruence and ligament elasticity sex differences in pelvic joint kinematics are under-investigated. Forty healthy and active males and females between the ages of 18 and 35 were recruited. 3D motion of the innominate bones and femur were recorded with a magnetic tracking device as the hips were loaded in standardised increments of 10 degrees in 3 positions - external rotation (ER), abduction (AB), and combined external rotation and abduction (AB+ER). While females had greater overall innominate motion, two distinct sex dominant patterns emerged. Patterns of innominate motion also differed when load was applied to the dominant rather than non-dominant limb.

As the main motion within the pelvis is intrinsic, the results of the present study point to a differing viscoelastic response and different movement strategies to passive load between the sexes. In addition, careful attention to limb dominance should be considered when testing SIJ motion.

PMID: 19027341

Pelvic Floor

Man Ther. 2010 Jun;15(3):235-9. doi: 10.1016/j.math.2009.12.005. Epub 2010 Jan 21.

Assessment of pelvic floor muscle function in women with and without low back pain using transabdominal ultrasound.

Arab AM1, Behbahani RB, Lorestani L, Azari A.

Abstract

Pelvic floor muscle (PFM) dysfunction has been recently associated with the development of low back pain (LBP). Transabdominal ultrasound imaging has been established as an appropriate method for visualizing and measuring PFM function. No study has directly evaluated PFM function in individuals with and without LBP. The purpose of this study was to investigate the PFM function in women with and without LBP using transabdominal ultrasound. Convenience sample of 40 non-pregnant female participated in the study. Subjects were categorized into two groups: with LBP (n = 20) and without LBP (n = 20). The amount of bladder base movement on ultrasound (normalized to body mass index) was measured in all subjects and considered as an indicator of PFM function. Statistical analysis (Independent t-test) revealed significant difference in transabdominal ultrasound measurements for PFM function between the two groups (P = 0.04, 95% CI of difference: 0.002-0.27).

The results of this study indicate PFM dysfunction in individuals with LBP compared to those without LBP. The results could be beneficial to clinicians when assessing and prescribing therapeutic exercises for patients with LBP.

PMID: 20089440

Pelvis and gait

Acta Bioeng Biomech. 2012;14(2):83-9.

Three-dimensional analysis of the pelvic and hip mobility during gait on a treadmill and on the ground.

Staszkiwicz R1, Chwała W, Forczek W, Laska J.

Abstract

Pelvic girdle combines two units: passenger and locomotor. That is why the importance of this part of the body is emphasized by all researchers in terms of gait economy. The purpose of our research was to determine the changes of pelvic girdle mobility and hip joint in men in three planes of movement (sagittal, frontal and horizontal) during gait at a speed of 5 km/h. The methodology used here aimed at assessing the impact of the surface (ground or treadmill) on the mobility in those planes. To register overground and treadmill locomotion we applied: Vicon 250, Cardionics Treadmill 3113. The sample of the study was the group of 30 men aged between 21 and 23. The analysis of the results revealed the biggest impact of the type of surface on both pelvis and hip joint in the transverse plane. When the subjects moved on the natural ground, the pelvic range of motion (ROM) in this plane was more than twice wider than that in treadmill walking. Whereas in the case of hip joint, significantly higher ROM values occurred in the transverse plane during walking on the treadmill.

PMID: 22794116

SI Manips/foot pressure

J Altern Complement Med. 2014 Feb 4.

Immediate Effects of Bilateral Sacroiliac Joint Manipulation on Plantar Pressure Distribution in Asymptomatic Participants.

Méndez-Sánchez R, González-Iglesias J, Sánchez-Sánchez JL, Puente-González AS.

Abstract

OBJECTIVE: To investigate the immediate effects of manipulation of bilateral sacroiliac joints (SIJs) on the plantar pressure distribution in asymptomatic participants in the standing position.

DESIGN: Randomized, controlled, double-blind clinical trial.

PARTICIPANTS: Sixty-two asymptomatic men and women (mean age, 20.66±2.56 years) randomly assigned to 2 groups.

INTERVENTIONS: The experimental group underwent mobilization without tension of the hips in the supine position and high-velocity, low-amplitude manipulation in the SIJs bilaterally. The control group underwent only mobilization, without tension of the hips in supine position.

OUTCOME MEASURES: Pre- and postintervention outcomes measured by an assessor blinded to the treatment allocation of the participants included a baropodometric analysis performed by using a force platform. Baseline between-group differences were examined with a Kolmogorov-Smirnov test. A chi-square test was used for categorical data. Analysis of covariance (ANCOVA) was used to assess differences between groups, with the preintervention value as covariant (95% confidence level).

RESULTS:

At baseline, no variables significantly differed between groups. Baropodometric analysis showed statistically significant differences in the location of the maximum pressure point in the experimental group ($p=0.028$). Pre- and postintervention analysis with ANCOVA showed statistically significant differences between both groups in the left hindfoot load percentage (interaction $p=0.0259$; ANCOVA $p=0.0277$), right foot load percentage (ANCOVA $p=0.0380$), and surface of the right forefoot (interaction $p=0.0038$). There was also a significant effect in the variables that analyze the entire foot (left foot: surface [interaction $p=0.0452$], percentage of load [ANCOVA $p=0.0295$]) and between both groups (right foot: weight [interaction $p=0.0070$; ANCOVA $p=0.0296$]).

CONCLUSIONS:

Sacroiliac joint manipulation applied bilaterally in asymptomatic persons resulted in immediate changes in load distribution on plantar support in the standing position. Study limitations and suggestions for future studies are discussed.

Vulvodynia

Obstet Gynecol. 2014 Feb;123(2 Pt 1):225-31. doi: 10.1097/AOG.0000000000000066.

Factors associated with vulvodynia incidence.

Reed BD, Legocki LJ, Plegue MA, Sen A, Haefner HK, Harlow SD.

Author information

Abstract

OBJECTIVE:

To assess incidence rates of and risk factors for vulvodynia.

METHODS:

We conducted a longitudinal population-based study of women in southeast Michigan (Woman-to-Woman Health Study) using a validated survey-based screening test for vulvodynia that was repeated at 6-month intervals over 30 months. Unadjusted incidence rates were determined using Poisson models. Demographic and symptom-related risk factors for incidence were assessed using discrete time survival analysis.

RESULTS:

Women who screened negative for vulvodynia at baseline and were followed through at least one additional survey (n=1,786) were assessed for onset of vulvodynia. The incidence rate was 4.2 cases per 100 person-years, and rates per 100 person-years were greater in women who were younger (7.6 cases per 100 person-years at age 20 years, compared with 3.3 cases per 100 person-years at age 60 years), Hispanic (9.5 cases per 100 person-years), married, or living as married (4.9 cases per 100 person-years); had reported symptoms of vulvar pain but did not meet vulvodynia criteria on the initial survey (11.5 cases per 100 person-years); or had reported past symptoms suggesting a history of vulvodynia (7.5 cases per 100 person-years). Increased risk of new-onset vulvodynia also included baseline sleep disturbance, chronic pain in general, specific comorbid pain disorders, and specific comorbid psychological disorders.

CONCLUSIONS:

The incidence rates of vulvodynia differ by age, ethnicity, and marital status. Onset is more likely among women with previous symptoms of vulvodynia or those with intermediate symptoms not meeting criteria for vulvodynia and among those with pre-existing sleep, psychological, and comorbid pain disorders. This suggests vulvodynia is an episodic condition with a potentially identifiable prodromal phase.

LEVEL OF EVIDENCE:: II. PMID: 24402591

CERVICAL SPINE

Manual therapy with chronic NP

Manual Therapy. Available online 11 January 2014, In Press, Corrected Proof — Note to users

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

Honorio Izquierdo Péreza, Jose Luis Alonso Perez, b, f, Alfonso Gil Martinezc, d, Roy La Touche, d, Sergio Lerma-Larad, e, Noelia Commeaux Gonzalezb, Hector Arribas Perezf, Mark D. Bishopg, Josue Fernández-Carnerob, h, Corresponding author contact information,

Abstract

BACKGROUND:

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).

METHODS:

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.

RESULTS:

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.

CONCLUSION:

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: Manual therapy; Musculoskeletal manipulations; Chronic neck pain; Randomized controlled trial

Traction and exercise

Journal of Orthopaedic & Sports Physical Therapy

February 2014, Vol. 44, No. 2, pp. 45-57

Posted online on February 1, 2014.

(doi:10.2519/jospt.2014.5065)

RESEARCH REPORT

Exercise Only, Exercise With Mechanical Traction, or Exercise With Over-Door Traction for Patients With Cervical Radiculopathy, With or Without Consideration of Status on a Previously Described Subgrouping Rule: A Randomized Clinical Trial

Authors: Julie M. Fritz, PT, PhD, ATC1,2, Anne Thackeray, PT, MPH1, Gerard P. Brennan, PT, PhD, FAAOMPT2, John D. Childs, PT, PhD, FAAOMPT3

Study Design Randomized clinical trial.

Objectives To examine the effectiveness of cervical traction in addition to exercise for specific subgroups of patients with neck pain.

Background Cervical traction is frequently used, but its effectiveness has not been adequately examined. Existing studies have failed to target patients most likely to respond. Traction is typically recommended for patients with cervical radiculopathy. A prediction rule has been described to identify a narrower subgroup of patients likely to respond to cervical traction.

Methods Patients with neck pain and signs of radiculopathy were randomized to 4 weeks of treatment with exercise, exercise with mechanical traction, or exercise with over-door traction. Baseline assessment included subgrouping-rule status. The primary outcome measure (Neck Disability Index, scored 0–100) and secondary outcome measure (neck and arm pain intensity) were assessed at 4 weeks, 6 months, and 12 months after enrollment. The primary analyses examined 2-way treatment-by-time interactions. Secondary analyses examined validity of the subgrouping rule by adding 3-way interactions.

Results

Eighty-six patients (53.5% female; mean age, 46.9 years) were enrolled in the study. Intention-to-treat analysis found lower Neck Disability Index scores at 6 months in the mechanical traction group compared to the exercise group (mean difference between groups, 13.3; 95% confidence interval: 5.6, 21.0) and over-door traction group (mean difference between groups, 8.1; 95% confidence interval: 0.8, 15.3), and at 12 months in the mechanical traction group compared to the exercise group (mean difference between groups, 9.8; 95% confidence interval: 0.2, 19.4). Secondary outcomes favored mechanical traction at several time points. The validity of the subgrouping rule was supported on the Neck Disability Index at the 6-month time point only.

Conclusion

Adding mechanical traction to exercise for patients with cervical radiculopathy resulted in lower disability and pain, particularly at long-term follow-ups. The study protocol was registered at <http://clinicaltrials.gov> (NCT00979108).

Level of Evidence Therapy, level 2b-. *J Orthop Sports Phys Ther* 2014;44(2):45–57. Epub 9 January 2014. doi:10.2519/jospt.2014.5065 **Keyword:** neck, nerve roots, spine

Visual disturbances

Man Ther. 2014 Jan 27. pii: S1356-689X(14)00006-X. doi: 10.1016/j.math.2014.01.005

Characteristics of visual disturbances reported by subjects with neck pain.

Treleaven J1, Takasaki H2.

Abstract

Visual symptoms are often reported by patients with neck pain. The aim of the study was to report on the prevalence and most troublesome visual disturbances in subjects with neck pain. Seventy subjects with neck pain and seventy healthy control subjects answered questions about the presence and magnitude (/12) - product of frequency (0-4) and intensity (0-3) of each of 16 visual symptoms noted to be associated with neck pain and other possible causes. A visual complaint index (VCI) (/168) was generated from the sum of the magnitude rating of 14 significant symptoms. The neck pain group had significantly ($P > 0.05$) greater prevalence and magnitude of 14/16 visual complaints and VCI (mean 27.4) compared to control subjects (mean 6.2). The most prevalent symptoms were 'need to concentrate to read' (70%) and 'sensitivity to light' (58.6%). The least prevalent were 'double vision' (28.6%) and 'dizzy reading' (38.6%). The most troublesome symptoms (greatest magnitude) were 'need to concentrate to read' (3.4/12), 'visual fatigue' (3/12), 'difficulty judging distances' (2.1/12) and 'sensitivity to light' (2.1/12) while the least troublesome complaints were 'double vision' (0.5/12), 'red eyes' (1/12) and 'spots and words moving' (1/12).

The characteristics of the visual symptoms were mostly consistent for those previously associated with neck pain. Subjects with traumatic neck pain had a significantly higher VCI compared to those with idiopathic neck pain. The results could help with differential diagnosis. The visual symptoms might be related to eye movement control disturbances in neck pain, however further research is required.

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KEYWORDS: Neck pain, Visual disturbance, Whiplash PMID: 24521926

CRANIUM/TMJ

Posture/TMJ

Effects of head posture on cervical muscle thickness and activity in young adults with and without temporomandibular disorders □

Journal of Musculoskeletal Pain , 02/25/2014 Clinical Article ► [Access PubMed and Publisher](#)

Strini PJSA, et al. –

Abstract:

Objectives: To evaluate electrical activity [EMG] and muscular thickness by ultrasonography of sternocleidomastoid [SCM] muscles in young adults with temporomandibular disorders [TMD], and to determine the effects of head posture on these measures.

Methods: The study subjects were recruited into a TMD group and a healthy normal control group. The TMD diagnoses were made using the Research Diagnostic Criteria for TMD. The control group subjects did not meet those TMD criteria. The head tilt was clinically evaluated in all subjects. Data were collected three times at rest, maximal clenching, flexion, and extension of the head, bilaterally. Shapiro–Wilks, Mann–Whitney, Kruskal–Wallis, unpaired *t* test, ANOVA and Tukey test, and correlation and logistic regression were applied [$\alpha = 0.05$].

Results: The TMD group consisted of 19 individuals [age 25.4 ± 3.8 years]. The cControl groups consisted of 28 individuals [age 25.9 ± 4.7 years]. The controls showed greater values in activity and thickness for the right SCM than TMD subjects during flexion and relaxation, respectively. The TMD group presented lower thickness for both muscles when the head was tilted to the right, except during extension. During clenching, EMG activity was significantly higher for the TMD group when the head was to the right. The right SCM showed lower activity during flexion in the TMD group. Ultrasonography and EMG were positively correlated for the right SCM during flexion when the head was to the right. For the other positions, the correlations were negative. The TMD group was more likely to present a lower SCM activity during flexion.

Conclusions: The SCM thickness and activity are influenced by the presence of TMD during neck and mandibular movements, as well as the side of head tilt

HEADACHES

Placebo effect

Sci Transl Med. 2014 Jan 8;6(218):218ra5. doi: 10.1126/scitranslmed.3006175.

Altered placebo and drug labeling changes the outcome of episodic migraine attacks.

Kam-Hansen S, Jakubowski M, Kelley JM, Kirsch I, Hoaglin DC, Kaptchuk TJ, Burstein R.

Abstract

Information provided to patients is thought to influence placebo and drug effects.

In a prospective, within-subjects, repeated-measures study of 66 subjects with episodic migraine, we investigated how variations in medication labeling modified placebo and drug effects. An initial attack with no treatment served as a control. In six subsequent migraine attacks, each participant received either placebo or Maxalt (10-mg rizatriptan) administered under three information conditions ranging from negative to neutral to positive (told placebo, told Maxalt or placebo, told Maxalt) (N = 459 documented attacks). Treatment order was randomized. Maxalt was superior to placebo for pain relief. When participants were given placebo labeled as (i) placebo, (ii) Maxalt or placebo, and (iii) Maxalt, the placebo effect increased progressively. Maxalt had a similar progressive boost when labeled with these three labels. The efficacies of Maxalt labeled as placebo and placebo labeled as Maxalt were similar. The efficacy of open-label placebo was superior to that of no treatment. Relative to no treatment, the placebo, under each information condition, accounted for more than 50% of the drug effect. Increasing "positive" information incrementally boosted the efficacy of both placebo and medication during migraine attacks.

The benefits of placebo persisted even if placebo was honestly described. Whether treatment involves medication or placebo, the information provided to patients and the ritual of pill taking are important components of care.

PMID: 24401940

Manipulation and STM

Journal of Bodywork and Movement Therapies. Available online 10 January 2014, In Press, Corrected Proof — Note to users

Treatment of tension-type headache with articulatory and suboccipital soft tissue therapy: A double-blind, randomized, placebo-controlled clinical trial

Gemma V. Espí-López, PhD, PTa, Antonia Gómez-Conesa, PhD, PTb, Anna Arnal Gómez, PhD, PTa, Josep Benítez Martínez, PhD, PTa, Ángel Oliva Pascual-Vaca, PhD, PTc, Cleofás Rodríguez Blanco, PhD, PTc

SUMMARY:

This study researches the effectiveness of two manual therapy treatments focused on the suboccipital region for tension-type headache.

METHODS:

A randomized double-blind clinical trial was conducted over a period of four weeks with a follow-up at one month. Eighty-four patients with a mean age of 39.7 years (SD 11.4) with tension-type headache were assigned to 4 groups which included the following manual therapy treatment: suboccipital soft tissue inhibition; occiput-atlas-axis global manipulation; combination of both techniques; and a control group.

The primary assessment consisted of collecting socio-demographic data and headache characteristics in a one-month base period, data such as age, gender, severity of pain, intensity and frequency of headache, among other. Outcome secondary assessment were: impact of headache, disability, ranges of motion of the craniocervical junction, frequency and intensity of headache, and pericranial tenderness.

RESULTS:

In the month prior to the study, average pain intensity, was rated at 6.49 (SD 1.69), and 66.7% subjects suffered headaches of moderate intensity. After 8 weeks, statistically significant improvements were noted.

CONCLUSIONS:

OAA manipulative treatment and combined therapy treatments proved to be more effective than suboccipital soft tissue inhibition for tension-type headache. The treatment with suboccipital soft tissue inhibition, despite producing less significant results, also has positive effects on different aspects of headache.

KEYWORDS: Effectiveness; Tension-type headache; Manual therapy

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Eye blink/HA

Cephalalgia. 2014 Feb 24.

Subclinical cerebellar dysfunction in patients with migraine: Evidence from eyeblink conditioning.

Gerwig M1, Rauschen L, Gaul C, Katsarava Z, Timmann D.

Author information

Abstract

BACKGROUND:

Clinical findings suggest cerebellar dysfunction in patients with migraine. Eyeblink classical conditioning (EBCC) is a simple form of associative learning which depends on the integrity of the cerebellum. The aim of this study was to assess whether EBCC is disturbed in patients with migraine.

METHODS:

A delay conditioning paradigm was used in the headache-free interval in 32 female patients with migraine, in 24 of them without (MwoA) and eight with aura (MwA), and in 32 age-matched female controls. As primary outcome measure acquisition and as secondary outcome measures timing and extinction of conditioned eyeblink responses (CR) were assessed.

RESULTS:

CR acquisition was significantly reduced in all migraine patients (mean total CR incidence $35.2 \pm 22.1\%$) compared to controls ($54.7 \pm 21.3\%$; $P < 0.001$; Bonferroni-corrected P level < 0.025) and in MwA patients ($19.9 \pm 20.2\%$) compared to matched controls ($58.2 \pm 27.0\%$; $P = 0.006$) but not in MwoA patients ($40.3 \pm 20.6\%$) compared to matched controls ($53.6 \pm 19.7\%$; $P = 0.028$; Bonferroni-corrected P level < 0.0166). Decrease of CR incidences in MwA patients was not significantly different compared to MwoA patients ($P = 0.021$; Bonferroni-corrected P level < 0.0166). CR timing and extinction was not affected in migraine patients.

CONCLUSIONS:

Reduced acquisition of CRs in the cohort of female patients studied here supports findings of a cerebellar dysfunction in migraine.

KEYWORDS:

Migraine, associative learning, cerebellum, eyeblink conditioning

PMID: 24567118

Neck pain and headache

Cephalalgia. 2014 Feb 19.

Self-reported neck pain is associated with migraine but not with tension-type headache in adolescents.

Blaschek A1, Decke S, Albers L, Schroeder AS, Lehmann S, Straube A, Landgraf MN, Heinen F, von Kries R.

Abstract

AIM:

The aim of the present analysis is to confirm or refute the association of neck pain to migraine or tension-type headache and to assess whether this association is independent of other risk factors for headache.

METHODS:

Secondary school students were invited to complete a questionnaire on headache and lifestyle factors in a cross-sectional study. Neck pain was assessed via (a) a screening question concerning neck pain and (b) denoting affected areas in schematic drawings of the human body.

RESULTS:

Absolute increment in prevalence of headache with pain in the shoulder-neck region was between 7.5% and 9.6%. Gender, grade, stress and lifestyle factors were assessed as potential confounding factors. Nearly all factors were associated with shoulder-neck pain and most with headache. After adjustment for confounders, the association of neck pain with headache was almost completely confined to migraine (OR 2.39; 95% CI 1.48-3.85) and migraine + tension-type headache (OR 2.12; 95% CI 1.50-2.99), whereas the association with isolated tension-type headache was negligible (OR 1.22, 95% CI 0.87-1.69).

CONCLUSION:

Neck pain is associated with migraine but not with tension-type headache. A possible link between migraine and neck pain may be the cervico-trigeminal convergence of neck and meningeal sensory afferents or a disturbed descending inhibition in migraine.

KEYWORDS: Adolescents, headache, migraine, neck pain, tension-type headache PMID: 24554618

Adolescent MRI HA

Cephalalgia. 2014 Feb 11.

Adolescent cervical disc degeneration in MRI does not predict adult headache or neck pain: A 5-year follow-up of adolescents with and without headache.

Laimi K, Pitkänen J, Metsähonkala L, Vahlberg T, Mikkelsen M, Erkintalo M, Aromaa M, Rautava P, Anttila P, Oksanen A, Saltychev M, Sillanpää M.

Abstract

AIM:

The impact of early degenerative changes of the cervical spine on pain in adulthood is unknown. The objective was to determine whether degeneration in adolescence predicts headache or neck pain in young adulthood.

METHODS:

As part of a follow-up of schoolchildren with and without headache, 17-year-old adolescents with headache at least three times a month (N = 47) and adolescents with no headache (N = 22) participated in a magnetic resonance imaging (MRI) study of the cervical spine. The same adolescents were re-examined by phone interview at the age of 22 years (N = 60/69, 87%).

RESULTS:

Mild disc degeneration at the age of 17 years was common, but was not associated with either frequent or intensive headache or neck pain at the age of 22 years.

CONCLUSION:

Mild degenerative changes of the cervical spine in 17-year-old adolescents cannot be regarded as a cause of future headache or neck pain.

KEYWORDS:

Adolescent, MRI, disc degeneration, headache, neck pain

PMID: 24519700

Gender

J Headache Pain. 2014 Jan 27;15(1):6. doi: 10.1186/1129-2377-15-6.

Gender differences of cognitive function in migraine patients: evidence from event-related potentials using the oddball paradigm.

Wang R, Dong Z, Chen X, Zhang M, Yang F, Zhang X, Jia W, Yu S.

Abstract

BACKGROUND:

Migraine shows gender-specific incidence and has a higher prevalence in females. Gender plays an important role in the prevalence of migraine, but few studies have investigated the effect of gender on the cognitive functions of migraine patients. This study investigated gender differences in the cognitive function of migraine patients without aura.

METHODS:

We recruited 29 migraine patients (15 females; mean age 25.4 y) during the interictal period and 28 healthy age-matched participants (14 females; mean age 24.8 y). We used an auditory oddball paradigm to analyze target processing using event-related potentials.

RESULTS:

We investigated the N2 and P3 components. The P3 amplitude was decreased in patients compared with the control, and this reduction was not modulated by gender. These results of the P3 provided a new evidence for the dysfunction of cognitive function in migraine patients. The N2 amplitude was larger for male than female migraine patients, and this gender effect was not found in the control group.

CONCLUSIONS:

These results of the P3 provided a new evidence for the dysfunction of cognitive function in migraine patients. And those of N2 may explain that male patients have the super-sensitivity of cerebral function relevant to the early target-selection and response preparation. Our findings emphasize the importance of considering gender when researching the cognitive function of migraine patients.

PMID: 24467625

Vestibular

Occurrence of vestibular dysfunction

J Am Osteopath Assoc. 2014 Mar;114(3):172-8. doi: 10.7556/jaoa.2014.034.

Vestibular dysfunction in patients with chronic pain or underlying neurologic disorders.

Gilbert JW1, Vogt M, Windsor RE, Mick GE, Richardson GB, Storey BB, Herder SL, Ledford S, Abrams DA, Theobald MK, Cunningham D, Kelly L, Herring KV, Maddox ML.

Abstract

CONTEXT:

Individuals with vestibular dysfunction are at increased risk for falling. In addition, vestibular dysfunction is associated with chronic pain, which could present a serious public health concern as approximately 43% of US adults have chronic pain.

OBJECTIVE:

To assess the incidence of vestibular dysfunction in patients receiving medication for chronic, noncancer pain or other underlying neurologic disorders and to determine associated follow-up therapeutic and diagnostic recommendations.

METHODS:

The authors conducted a retrospective medical record review of consecutive patients who were treated in their private neuroscience practice with medications for chronic pain or underlying neurologic disorders in 2011. All patients underwent a series of tests using videonystagmography for the assessment of vestibular function. Test results and recommendations for therapy and additional testing were obtained.

RESULTS:

Medical records of 124 patients (78 women, 46 men) were reviewed. Vestibular deficits were detected in 83 patients (66.9%). Patient ages ranged from 29 through 72 years, with a mean age of 50.7 years for women and 52.5 years for men. Physician-recommended therapy and follow-up testing were as follows: 32 patients (38.6%), neurologic examination and possible magnetic resonance (MR) imaging or computed tomography (CT) of the brain; 26 patients (31.3%), vestibular rehabilitation therapy only; 22 patients (26.5%), vestibular and related balance-function rehabilitation therapy, further neurologic examination, and possible MR imaging or CT; 2 patients (2.4%), balance-function rehabilitation therapy and specialized internal auditory canal high-magnification MR imaging or CT to assess for acoustic neuroma; and 1 patient (1.2%), specialized internal auditory canal high-magnification MR imaging or CT to evaluate for possible intracanalicular acoustic neuroma.

CONCLUSION:

Patients being treated with medications for chronic, noncancer pain or other underlying neurologic disorders may have a higher-than-average incidence of vestibular dysfunction. Baseline assessment and monitoring of the vestibular apparatus may be indicated for these patients.

PMID: 24567270

CONCUSSIONS

Sleep

Am J Sports Med. 2014 Feb;42(2):472-8. doi: 10.1177/0363546513510389. Epub 2013 Nov 20.

Baseline Neurocognitive Testing in Sports-Related Concussions: The Importance of a Prior Night's Sleep.

McClure DJ, Zuckerman SL, Kutscher SJ, Gregory AJ, Solomon GS.
Author information

Abstract

BACKGROUND: The management of sports-related concussions (SRCs) utilizes serial neurocognitive assessments and self-reported symptom inventories to assess recovery and safety for return to play (RTP). Because postconcussive RTP goals include symptom resolution and a return to neurocognitive baseline levels, clinical decisions rest in part on understanding modifiers of this baseline. Several studies have reported age and sex to influence baseline neurocognitive performance, but few have assessed the potential effect of sleep. We chose to investigate the effect of reported sleep duration on baseline Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) performance and the number of patient-reported symptoms.

HYPOTHESIS: We hypothesized that athletes receiving less sleep before baseline testing would perform worse on neurocognitive metrics and report more symptoms.

STUDY DESIGN: Cross-sectional study; Level of evidence, 3.

METHODS: We retrospectively reviewed 3686 nonconcussed athletes (2371 male, 1315 female; 3305 high school, 381 college) with baseline symptom and ImPACT neurocognitive scores. Patients were stratified into 3 groups based on self-reported sleep duration the night before testing: (1) short, <7 hours; (2) intermediate, 7-9 hours; and (3) long, ≥ 9 hours. A multivariate analysis of covariance (MANCOVA) with an α level of .05 was used to assess the influence of sleep duration on baseline ImPACT performance. A univariate ANCOVA was performed to investigate the influence of sleep on total self-reported symptoms.

RESULTS: When controlling for age and sex as covariates, the MANCOVA revealed significant group differences on ImPACT reaction time, verbal memory, and visual memory scores but not visual-motor (processing) speed scores. An ANCOVA also revealed significant group differences in total reported symptoms. For baseline symptoms and ImPACT scores, subsequent pairwise comparisons revealed these associations to be most significant when comparing the short and intermediate sleep groups.

CONCLUSION: Our results indicate that athletes sleeping fewer than 7 hours before baseline testing perform worse on 3 of 4 ImPACT scores and report more symptoms. Because SRC management and RTP decisions hinge on the comparison with a reliable baseline evaluation, clinicians should consider sleep duration before baseline neurocognitive testing as a potential factor in the assessment of athletes' recovery.

KEYWORDS: ImPACT, athletes, concussion, mild traumatic brain injury, sleep

GLENOHUMERAL/SHOULDER

Rotation in the elevated position

Surg Radiol Anat. 2014 Jan 24.

Glenohumeral relationship in maximum elevation.

Inui H, Nobuhara K.

Abstract

PURPOSE:

The purpose of this study was to clarify rotational relationships between the anatomical landmarks of the glenohumeral joint in maximum elevation.

METHODS:

Twenty-five healthy volunteers (20 men, 5 women; mean age, 31 years) held the arm in maximum elevation in an open MRI system. In each three-dimensionally computer-generated image, elevation angle of the humerus in the plane of elevation was measured, based on the glenoid and the scapular planes. Using the equator set on the head surface by the plane parallel to the humeral axis, involving the head center and the bicipital groove, glenoid location and rotational relationships were investigated.

RESULTS:

The elevation angle was $102^{\circ} \pm 9^{\circ}$ in the plane $7^{\circ} \pm 8^{\circ}$ anterior to the scapular plane, and axial rotation was fixed with the glenoidal long axis parallel to the equator (within 2°). Each glenoid center located on antero-superior portion of the humeral head, and the direction from the top of the head to its location was the same as that of the shaft tilting, indicating the glenoid only translated without rotation after reaching the top of the head on the equator.

CONCLUSIONS:

Before reaching maximum elevation, the glenohumeral joint would be locked in axial rotation. The position when the glenoid is on the top of the humeral head with the humeral shaft perpendicular to the glenoid is considered to be essentially the final position of elevation, above which the glenohumeral joint only translates without axial rotation even if the humerus is more elevated.

PMID: 24458714

Shoulder pain and 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 RA1, Simon CB, Valencia C, George SZ.

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.

ROTATOR CUFF

Impingement

Knee Surgery, Sports Traumatology, Arthroscopy February 2014

Quantitative and qualitative analyses of subacromial impingement by kinematic open MRI

Atsushi Tasaki, Akimoto Nimura, Taiki Nozaki, Akira Yamakawa, Mamoru Niitsu, Wataru Morita, Yoshimitsu Hoshikawa, Keiichi Akita

Abstract

Purpose

Quantitative and qualitative kinematic analyses of subacromial impingement by 1.2T open MRI were performed to determine the location of impingement and the involvement of the acromioclavicular joint.

Methods

In 20 healthy shoulders, 10 sequential images in the scapular plane were taken in a 10-s pause at equal intervals from 30° to maximum abduction in neutral and internal rotation. The distances between the rotator cuff (RC) and the acromion and the acromioclavicular joint were measured. To comprehend the positional relationships, cadaveric specimens were also observed.

Results

Although asymptomatic, the RC came into contact with the acromion and the acromioclavicular joint in six and five cases, respectively. The superior RC acted as a depressor for the humeral head against the acromion as the shoulder elevated. The mean elevation angle and distance at the closest position between the RC and the acromion in neutral rotation were 93.5° and 1.6 mm, respectively, while those between the RC and the acromioclavicular joint were 86.7° and 2.0 mm. When comparing this distance and angle, there was no significant difference between the RC to the acromion and to the acromioclavicular joint. The minimum distance between the RC and the acromion was significantly shorter than that between the greater tuberosity and the acromion. The location of RC closest to the acromion and the acromioclavicular joint differed significantly.

Conclusion

Although asymptomatic, contact was found between the RC and the acromion and the acromioclavicular joint. The important role of the RC to prevent impingement was observed, and hence, dysfunction of the RC could lead to impingement that could result in a RC lesion. The RC lesions may differ when they are caused by impingement from either the acromion or the acromioclavicular joint.

ELBOW

Cold sensitivity

Clin J Pain. 2014 Jan 28.

Cold Hyperalgesia Associated with Poorer Prognosis in Lateral Epicondylalgia: A One Year Prognostic Study of Physical and Psychological Factors.

Coombes BK, Bisset L, Vicenzino B.
Author information

Abstract

BACKGROUND:

Predictors of outcome in lateral epicondylalgia, which is mainly characterised as a mechanical hyperalgesia, are largely limited to socio-demographic and symptomatic factors. Quantitative sensory testing is used to study altered pain processing in various chronic pain conditions and may be of prognostic relevance.

METHODS:

The predictive capacity of early measures of physical and psychological impairment on pain and disability and mechanical hyperalgesia, were examined using data from 41 patients assigned to placebo in a prospective randomised controlled trial of unilateral lateral epicondylalgia. Quantitative sensory testing (pressure, cold pain thresholds), motor function (pain free grip) and psychological factors (Tampa scale of kinesiophobia, Hospital anxiety and depression scale) were measured at baseline. The outcome measures were the Patient Rated Tennis Elbow Evaluation (PRTEE) scale and pressure pain threshold (PPT) measured by digital algometry at the affected elbow. Backwards stepwise linear regression was used to predict PRTEE and PPT scores at two and twelve months.

RESULTS:

Cold pain threshold was the only consistent predictor for both PRTEE ($P < 0.034$) and PPT ($P < 0.048$). Initial PRTEE was the strongest single predictor of PRTEE at 2 months, while female sex was the strongest single predictor of PPT ($P < 0.002$). At one year, final models explained 9 to 52% of the variability in pain and disability and mechanical hyperalgesia respectively.

DISCUSSION:

Early assessment of cold pain threshold could be a useful clinical tool to help identify patients at risk of poorer outcomes and might provide direction for future research into mechanism-based treatment approaches for these patients.

C spine involvement in lateral epicondylitis

J Manipulative Physiol Ther. 2014 Feb;37(2):79-86. doi: 10.1016/j.jmpt.2013.12.005. Epub 2013 Dec 28.

Bilateral cervical dysfunction in patients with unilateral lateral epicondylalgia without concomitant cervical or upper limb symptoms: a cross-sectional case-control study.

Coombes BK1, Bisset L2, Vicenzino B3.

OBJECTIVE:

The purposes of this study were to examine the prevalence and distribution of spinal and neurodynamic dysfunction in a population with unilateral lateral epicondylalgia (LE) without concomitant cervical or upper limb symptoms, compare with cervical examination in a healthy control population, and investigate potential associations with clinical and demographic factors.

METHODS:

This cross-sectional study included 165 patients with LE along with 62 healthy controls. Manual examination (C4-T2) was performed by an unblinded examiner with dysfunction defined as pain of 3 or higher on a numerical rating scale in the presence of a severe or moderate hypomobility or hypermobility. Neurodynamic testing (radial nerve) was classified positive if LE symptoms were reproduced and altered by sensitization maneuver. Repeated-measures analysis of variance was used to compare sides, segmental levels, and groups. Regression analysis was used to determine associations between variables.

RESULTS:

Thirty-six percent of patients had dysfunction of at least 1 spinal palpation site, and 41% had a positive neurodynamic test. Significant group-by-level ($P = .02$) and group-by-side ($P = .04$) interactions were found for spinal examination, with greater dysfunction bilaterally at C4-7 ($P < .01$) in LE compared with control arms. The number of positive palpation sites was associated with injury duration ($P = .03$), whereas neurodynamic response was associated with severity of resting pain ($P = .04$).

CONCLUSIONS:

Cervical dysfunction is evident in individuals with LE without obvious neck pain and may reflect central sensitization mechanisms. Further study of the nature of the relationship between cervical dysfunction and LE is required.

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KEYWORDS: Musculoskeletal Manipulations, Neck Pain, Radial Nerve, Tennis Elbow PMID: 24378321

WRIST AND HAND

Hemiplegic manipulation of wrist

Journal of Hand Therapy. Available online 2 January 2014, In Press, Corrected Proof — Note to users

Manual mobilization of the wrist: A pilot study in rehabilitation of patients with a chronic hemiplegic hand post-stroke

Fred Smedes, MASc, PT MTa, b, Arjan van der Salm, PhD, PT, MTc, Gerard Koel, MSc, PT, MTc, d, Frits Oosterveld, PhD, PTc

Abstract

STUDY DESIGN: Prospective pilot cohort study, quasi-experimental design.

INTRODUCTION: Restricted hand mobility, limitation in activities and participation, due to relative immobilization of the hemiplegic hand are frequently reported after stroke.

PURPOSE:

To establish whether manual mobilization of the wrist has an additional value in the treatment of the hemiplegic hand.

METHODS:

Eighteen patients received treatment twice a week for a period of 6 weeks. Both treatment groups received therapy based upon the Dutch guidelines for stroke. In the intervention group, a 10-min manual mobilization of the wrist was integrated. The primary outcomes were active and passive wrist mobility and activity limitation. The secondary outcomes were spasticity, grip strength, and pain. Data were collected at 0, 6 and 10 weeks. Statistical analysis was performed using the Friedman's test, related t-test, Wilcoxon test, independent t-test, and Mann–Whitney U-test.

RESULTS:

Statistically significant differences were found in the intervention group; between T0 and T2 measurements in active wrist extension (+18°; $p < 0.001$), in passive wrist extension (+15°; $p < 0.001$), and in the Frenchay Arm Test (+2 points, 18%; $p = 0.038$). This significant improvement was not found in the control group. Statistically significant differences were found between the two groups in active and passive wrist extension ($p < 0.001$; $p = 0.002$), as well as a change in Frenchay Arm Test ($p = 0.01$).

CONCLUSION:

This study suggests that manual mobilization of the wrist has a positive influence on the recovery of the hemiplegic hand. Replication of the results is needed in a large scale randomized controlled trial.

LEVEL OF EVIDENCE: 4. KEYWORDS: Hemiplegic hand; Manual therapy; Stroke

HIP

Alteration in gait with impingement

PM R. 2014 Feb 14. pii: S1934-1482(14)00070-7. doi: 10.1016/j.pmrj.2014.02.002.

Differences in the Association of Hip Cartilage Lesions and Cam-type Femoroacetabular Impingement with Movement Patterns: A Preliminary Study.

Kumar D1, Dillon A2, Nardo L2, Link TM2, Majumdar S2, Souza RB3.

Author information

Abstract

OBJECTIVE:

Preliminary study to investigate the differences in hip movement patterns during different daily and athletic activities in individuals with cam-type femoroacetabular impingement (FAI) with and without cartilage lesions compared with controls.

DESIGN:

Controlled laboratory study using a Cross-sectional design.

SETTING:

Research Institution with Tertiary Care Medical Center.

PARTICIPANTS:

Fifteen subjects [M:F - 13:2, Age- 31.6±9.7 years (22-52), BMI- 24.9±4.6 (18.8-38.4), FAI: Control = 7:8].

METHODS:

All subjects had 3-Tesla MR imaging of the hip and also underwent 3-D motion capture during walking, deep-squat and drop landing tasks. Experienced radiologists graded cartilage lesions on clinical MR images.

OUTCOMES:

Peak kinematic and kinetic variables were compared between those with and without FAI, and those with FAI and cartilage lesions compared to subjects without cartilage lesions. Results: Subjects with FAI demonstrated no significant differences for walking or drop-landing compared to controls. However, during deep-squat, subjects with FAI adducted more and had greater internal rotation moment. Subjects with cartilage lesions in the presence of a cam-lesion demonstrated - no difference for walking; greater adduction, greater internal rotation moment and lower transverse plane range of motion during deep-squat; and greater adduction and lower internal rotation during drop-landing, compared to those without cartilage lesions.

CONCLUSIONS:

We observed differences in movement patterns between subjects with FAI compared to controls. However, the differences were more pronounced between subjects with FAI who had cartilage lesions compared to subjects who did not have cartilage lesions. These findings highlight the importance of understanding the complex interplay between bony morphology, cartilage lesions, and movement patterns in individuals with cam-type FAI.

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KEYWORDS: Drop-landing, Gait, Joint power, Kinematics, Kinetics, Squat PMID: 24534097

Piriformis stretch

Med Eng Phys. 2014 Feb;36(2):212-8. doi: 10.1016/j.medengphy.2013.10.016. Epub 2013 Nov 19.

Comparison of two stretching methods and optimization of stretching protocol for the piriformis muscle.

Gulledge BM1, Marcellin-Little DJ2, Levine D3, Tillman L4, Harrysson OL5, Osborne JA6, Baxter B7.

Abstract

BACKGROUND:

Piriformis syndrome is an uncommon diagnosis for a non-discogenic form of sciatica whose treatment has traditionally focused on stretching the piriformis muscle (PiM). Conventional stretches include hip flexion, adduction, and external rotation.

METHODS:

Using three-dimensional modeling, we quantified the amount of (PiM) elongation resulting from two conventional stretches and we investigated by use of a computational model alternate stretching protocols that would optimize PiM stretching. Seven subjects underwent three CT scans: one supine, one with hip flexion, adduction, then external rotation (ADD stretch), and one with hip flexion, external rotation, then adduction (ExR stretch). Three-dimensional bone models were constructed from the CT scans. PiM elongation during these stretches, femoral neck inclination, femoral head anteversion, and trochanteric anteversion were measured. A computer program was developed to map PiM length over a range of hip joint positions and was validated against the measured scans.

RESULTS:

ExR and ADD stretches elongated the PiM similarly by approximately 12%. Femoral head and greater trochanter anteversion influenced PiM elongation. Placing the hip joints in 115° of hip flexion, 40° of external rotation and 25° of adduction or 120° of hip flexion, 50° of external rotation and 30° of adduction increased PiM elongation by 30-40% compared to conventional stretches (15.1 and 15.3% increases in PiM muscle length, respectively).

CONCLUSIONS:

ExR and ADD stretches elongate the PiM similarly and therefore may have similar clinical effectiveness. The optimized stretches led to larger increases in PiM length and may be more easily performed by some patients due to increased hip flexion.

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KEYWORDS: Biomodeling, Computational modeling, Piriformis muscle, Stretching

HIP/LABRUM

Labral tears

Clin Orthop Surg. 2009 Dec;1(4):230-5. doi: 10.4055/cios.2009.1.4.230. Epub 2009 Nov 25.

Acetabular labral tears in patients with sports injury.

Kang C, Hwang DS, Cha SM.

BACKGROUND:

We wanted to investigate acetabular labral tears and their correlation with femoroacetabular impingement in patients with sports injury.

METHODS:

Among 111 patients who were diagnosed with the acetabular labral tears after arthroscopic treatment from January 2004 to December 2007, we selected 41 patients with sports injury. There were 12 cases of Taekwondo injury, 5 of golf injury, 4 of soccer injury, 3 of gymnastics injury, 2 of Hapkido injury, 2 of aerobics injury, 2 of rock-climbing injury, 2 of fitness training injury and 9 of other sports injuries. We checked the subtypes of acetabular labral tears and the accompanying femoroacetabular impingement. For the cases with accompanying femoroacetabular impingement, we investigated the subtypes according to the types of sports, gender and age. At last follow-up, we checked the Harris Hip Score (HHS), the Hip Outcome Score (HOS) sports scale and the percentage of patients who returned to their sports activity.

RESULTS:

The average age of symptomatic onset was 26 years (range, 12 to 65 years). The ratio of males to females was 29 : 12. An average duration of the hip pain was 17 months (range, 1 to 60 months). The degenerative type of acetabular labral tears was the most prevalent with 32 cases (78%), and there were 9 cases (22%) of the partial tear type. Thirty cases (73%) were accompanied by femoroacetabular impingement. The average age of the 23 cases (56%) of the cam-type was 23 years (range, 12 to 48 years), and it was more likely to occur in men (87%) and for people practicing martial arts such as Taekwondo or Hapkido. An average age of the 5 cases (12%) of the pincer-type was 26 (range, 16 to 43 years), it usually occurred in women (60%) and for non-martial arts such as golf and gymnastics. There were 2 cases of the mixed type (cam + pincer-type). At 27 months follow-up, the HHS was 61 to 92 points, the HOS sports scale increased 43 to 75%, and the rate of returning to sports was 71%.

CONCLUSIONS:

In spite of the early expression of symptoms and the short duration of the acetabular labral tears, the high rate of degenerative acetabular labral tears in sports patients is likely associated with repetitive injury after the expression of symptoms. Femoroacetabular impingement in sports patients is seemed to be a cause of the early occurrence of acetabular labral tears. Because the possibility of acetabular labral tears is high in femoroacetabular impingement, sports patients may need to undergo early screening for the diagnosis and care of femoroacetabular impingement.

KEYWORDS: Actabular labral tear, Femoroacetabular impingement, Sports injury PMID: 19956481

Hip Impingement demographics

The demographic characteristics of high-level and recreational athletes undergoing hip arthroscopy for femoroacetabular impingement: A sports-specific analysis

Arthroscopy, 02/28/2014 Evidence Based Medicine Clinical Article

Purpose

The purpose of this study was to determine differences in age, gender, and the need for bilateral surgery between high-level athletes grouped by sports with similar mechanical demands on the hip and recreational athletes undergoing hip arthroscopy for femoroacetabular impingement (FAI).

Methods

By use of a hip-preservation center registry, a retrospective review of patients undergoing hip arthroscopy for FAI between March 2010 and April 2012 was performed. Athletes were categorized as high level (high school, collegiate, or professional) or recreational. We performed a subgroup analysis for high-level athletes, looking at differences among contact, cutting, impingement, overhead/asymmetric, endurance, and flexibility sports.

Results

The study included 288 high-level athletes and 334 recreational athletes. Being a high-level athlete was associated with a younger age (mean age, 20.2 years v 33.0 years; odds ratio, 0.69; $P < .001$) and male gender (61.5% v 53.6%; odds ratio, 1.75; $P = .03$). The percentage of high-level athletes undergoing bilateral surgery was higher than that of recreational athletes (28.4% v 15.9%); however, this association was found to be confounded by age on multivariate analysis. The most common sports for high-level athletes were soccer, hockey, and football. Athletes participating in cutting sports were significantly younger than athletes participating flexibility, contact, or impingement sports.

Conclusions

When compared with recreational athletes undergoing arthroscopic treatment for FAI, high-level athletes are more likely to be younger, to be male, and to undergo bilateral surgery. When high-level athletes are grouped by the mechanical demands placed on the hip by their sport, athletes participating in cutting sports are more likely to be younger than those in the other groups.

Level of Evidence Level IV, case series

Innervation

The innervation of the human acetabular labrum and hip joint: an anatomic study

Abdullah Alzahrani, Kamal Bali, Ravi Gudena, Pamela Railton, Dragana Ponjevic, John R Matyas and James N Powell

BMC Musculoskeletal Disorders 2014, **15**:41 doi:10.1186/1471-2474-15-41

Abstract (provisional)

Background

The aim of the current study was to evaluate the innervation of the acetabular labrum in the various zones and to understand its potential role in nociception and proprioception in hips with labral pathology.

Methods

A total of twenty hip labrums were tagged and excised intraoperatively from patients undergoing a total hip replacement. After preparation, the specimens were cut to a thickness of 10 µm and divided into four quadrants (zones) using a clock face pattern. Neurosensory structure distribution was then evaluated using Hematoxylin and Eosin (H and E), and immunoreactivity to S-100.

Results

All specimens had abundant free nerve endings (FNEs). These were seen predominantly superficially and on the chondral side of the labrum. In addition, predominantly three different types of nerve end organs (NEOs) were identified in all twenty specimens. FNEs and NEOs were more frequently seen in the antero-superior and postero-superior zones. Four specimens had abundant vascularity and disorganised architecture of FNEs in the deeper zones of the antero-superior quadrant suggestive of a healed tear. Myofibroblasts were present in abundance in all the labral specimens and were distributed uniformly throughout all labral zones and depth.

Conclusions

The current study shows that the human acetabular labrum has abundant FNEs and NEOs. These are more abundant in the antero-superior and postero-superior zones. The labrum, by virtue of its neural innervation, can potentially mediate pain as well as proprioception of the hip joint, and be involved in neurosecretion that can influence connective tissue repair

Impact of labral pathology pt one

Knee Surgery, Sports Traumatology, Arthroscopy February 2014

The hip fluid seal—Part I: the effect of an acetabular labral tear, repair, resection, and reconstruction on hip fluid pressurization

Marc J. Philippon, Jeffrey J. Nepple, Kevin J. Campbell, Grant J. Dornan, Kyle S. Jansson, Robert F. LaPrade, Coen A. Wijdicks

Abstract

Purpose

The acetabular labrum is theorized to be important to normal hip function by creating intra-articular fluid pressurization through the hip fluid seal. However, the effect of a labral tear or partial labral resection, and interventions including labral repair and labral reconstruction, on the hip fluid seal remains to be defined. The purpose of this study was to characterize intra-articular fluid pressurization in six labral conditions: intact, tear, repair (looped vs. through sutures), partial resection, reconstruction with iliotibial band, and complete resection.

Methods

Eight cadaveric hips with a mean age of 47.8 years (SD 4.3, range 41–51) were included in the study. For each labral condition, the hip was compressed with a force of 2.7 times body weight (2,118 N) while intra-articular pressure was continuously measured with 1.0×0.3 mm pressure transducers. Peak intra-articular pressure measurements for each condition were normalized relative to the intact state. Statistical analyses were performed utilizing linear mixed-effects models with repeated measures analysis.

Results

Intra-articular fluid pressurization of the intact state varied from 78 to 422 kPa (mean 188 kPa \pm SD 120). Labral tear, partial resection, and complete resection resulted in average pressurization of 75 ± 33 , 53 ± 37 , and 24 ± 18 %, respectively compared with the intact state. Through type labral repair resulted in significantly greater increases in pressurization from the labral tear state, compared with the looped type repair (median increase; +46 vs. -12 %, $p = 0.029$). Labral reconstruction resulted in a mean pressurization of 110 ± 38 % relative to intact state, with a significant 56 ± 47 % improvement in pressurization compared with partial labral resection ($p = 0.009$).

Conclusions

Partial labral resection caused significant decreases in intra-articular fluid pressurization. Through type labral suture repair restored the fluid pressurization better than looped type repairs. Labral reconstruction significantly improved pressurization to levels similar to the intact state. This study demonstrated the effect of labral tears and partial resections on intra-articular fluid pressurization via the hip fluid seal, and it also demonstrated improvements in pressurization seen with through type labral repairs and labral reconstructions.

Impact of labral pathology

Knee Surgery, Sports Traumatology, Arthroscopy February 2014

The hip fluid seal—Part II: The effect of an acetabular labral tear, repair, resection, and reconstruction on hip stability to distraction

Jeffrey J. Nepple, Marc J. Philippon, Kevin J. Campbell, Grant J. Dornan, Kyle S. Jansson, Robert F. LaPrade, Coen A. Wijdicks

Purpose

The acetabular labrum is theorized to be important to normal hip function by providing stability to distraction forces through the suction effect of the hip fluid seal. The purpose of this study was to determine the relative contributions of the hip capsule and labrum to the distractive stability of the hip, and to characterize hip stability to distraction forces in six labral conditions: intact labrum, labral tear, labral repair (looped vs. through sutures), partial resection, labral reconstruction with iliotibial band, and complete resection.

Methods

Eight cadaveric hips with a mean age of 47.8 years (SD 4.3, range 41–51 years) were included. For each condition, the hip seal was broken by distracting the hip at a rate of 0.33 mm/s while the required force, energy, and negative intra-articular pressure were measured. For comparisons between labral conditions, measurements were normalized to the intact labral state (percent of intact).

Results

The relative contribution of the labrum to distractive stability was greatest at 1 and 2 mm of displacement, where it was significantly greater than the role of the capsule and accounted for 77 % (SD 27 %, $p = 0.006$) and 70 % (SD 7 %, $p = 0.009$) of total distractive stability, respectively. The relative contribution of the capsule to distractive stability increased with progressive displacement, providing 41 % (SD 49 %) and 52 % (SD 53 %) of distractive stability at 3 and 5 mm of distraction, respectively. The maximal distraction force required to break the hip seal in the intact labral state (capsule removed) varied from 124 to 150 N. Labral tear, partial resection, and complete resection resulted in average maximal distraction forces of 76 % (SD 34 %), 29 % (SD 26 %), and 27 % (SD 22 %), respectively, compared to the intact state. Through type labral repairs resulted in significantly greater improvements (from the labral tear state) in maximal negative pressure generated, compared to looped type repairs (median increase; +32 vs. -9 %, $p = 0.029$). Labral reconstruction resulted in a mean maximal distraction force of 66 % (SD 35 %), with a significant improvement of 37 % compared to partial labral resection ($p < 0.001$).

Conclusion

The acetabular labrum was the primary hip stabilizer to distraction forces at small displacements (1–2 mm). Partial labral resection significantly decreased the distractive strength of the hip fluid seal. Labral reconstruction significantly improved distractive stability, compared to partial labral resection. The results of this study may provide insight into the relative importance of the capsule and labrum to distractive stability of the hip and may help to explain hip microinstability in the setting of labral disease.

Investigation performed at the Department of BioMedical Engineering of the Steadman Philippon Research Institute, Vail, CO.

Labral surgery

Knee Surg Sports Traumatol Arthrosc. 2014 Feb 5.

Modest mid-term outcomes after isolated arthroscopic debridement of acetabular labral tears.

Krych AJ, Kuzma SA, Kovachevich R, Hudgens JL, Stuart MJ, Levy BA.

Author information

Department of Orthopedic Surgery, The Sports Medicine Center, Mayo Clinic and Mayo Foundation, 200 First Street SW, Rochester, MN, 55905, USA.

Abstract

PURPOSE:

Currently, there is a paucity of literature regarding outcomes after isolated labral debridement. The purpose of this study was to (1) report the reoperation rate following isolated labral debridement, (2) report clinical and functional outcomes after labral debridement with a minimum 2-year follow-up and (3) identify risk factors for worse clinical and functional outcomes. It was hypothesized that inferior outcomes are associated with an increasing Tönnis grade and those with untreated femoral acetabular impingement (FAI).

METHODS:

The records of patients undergoing hip arthroscopy between 1998 and 2005 were reviewed. Patients with labral tears who underwent isolated arthroscopic labral debridement were identified. Kaplan-Meier estimate of failure (defined as subsequent surgery) was performed for all patients. Patients with minimum 2-year follow-up were assessed with Modified Harris Hip Score (MHHS) and Hip Outcome Score (HOS). Univariate analysis was then performed to assess which factors were associated with worse clinical and functional outcomes.

RESULTS:

Fifty-nine hips in 57 patients met our inclusion criteria (39 females, 18 males) with a mean age of 46 ± 14 years and mean follow-up of 5 (range 2-14) years. Overall, 45 % of the hips failed for repeat surgery (20 %) or rating for hip function as abnormal or severely abnormal (25 %). Twelve hips (20 %) required subsequent surgical intervention at a mean 23 (range 6-60) months (7 total hip arthroplasties, 2 open revisions, 3 arthroscopic revisions). Of the remaining hips, mean MHHS was 83.4 ± 19.7 , mean HOS ADL score was 83.8 ± 21.3 and mean HOS sport score was 70.6 ± 32.9 , with 33 of 41 (75 %) reporting normal or nearly normal current level of function. Univariate analysis revealed that hips with untreated bony impingement ($p = 0.01$) or requiring concomitant chondroplasty ($p = 0.03$) had inferior clinical outcome scores.

CONCLUSIONS:

Isolated arthroscopic labral debridement for hip labral tears had 45 % combined poor results when strictly defining failure as repeat surgery or abnormal hip rating. Untreated FAI and concomitant chondroplasty were risk factors for inferior outcome. We recommend concomitant treatment for bony impingement lesions and preservation of the labrum whenever possible.

LEVEL OF EVIDENCE: Retrospective case series, Level IV. PMID: 24493256

Replacements

Quality of life

Osteoarthritis Cartilage. 2014 Jan 1. pii: S1063-4584(13)01039-X. doi: 10.1016/j.joca.2013.12.006.

Total hip replacement: a systematic review and meta-analysis on mid-term quality of life.

Shan L1, Shan B2, Graham D3, Saxena A4.
Author information

Abstract

OBJECTIVE:

Total hip replacement (THR) is one of the most successful and frequently performed operations worldwide. Health-related quality of life (HRQOL) is a key outcome measure of surgery. We investigated mid-term HRQOL after THR in patients with osteoarthritis (OA).

DESIGN:

A systematic review of clinical studies published after January 2000 was performed using strict eligibility criteria. Quality appraisal and data tabulation were performed using pre-determined forms. Data were synthesised by narrative review and random-effects meta-analysis using standardised response means. Tau² and I² values and Funnel plots were analysed.

RESULTS:

20 studies were included. Mid-term post-operative HRQOL is superior compared to pre-operative status on qualitative and quantitative analysis. Pooled response means of total Harris Hip Score (HHS) ($P < 0.00001$) and combined pain ($P = 0.00001$) and physical function ($P < 0.00001$) domains of Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and HHS improved markedly up to 7 years. Medical Outcomes Survey Short Form 36 shows physical functioning (PF) ($P < 0.00001$), bodily pain (BP) ($P < 0.00001$), role physical ($P = 0.001$), role emotional ($P = 0.04$), and social functioning (SF) ($P = 0.03$) were improved up to 7 years. General health (GH) ($P = 0.29$), mental health (MH) ($P = 0.43$), and vitality ($P = 0.17$) was similar. HRQOL is at least as good as reference populations in the first few years and subsequently plateaus or declines. Patient satisfaction and functional status was favourable. There was significant heterogeneity amongst all studies, but publication bias was low in pooled analysis.

CONCLUSION: THR confers significant mid-term HRQOL benefits across a broad range of health domains. Further studies based on consistent guidelines provided in this review are required.

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KEYWORDS: Mid-term, Orthopaedic surgery, Osteoarthritis, Quality of life, Total hip arthroplasty, Total hip replacement

Likelihood of replacement

Arthritis Care Res (Hoboken). 2014 Jan 27. doi: 10.1002/acr.22279.

Lifetime risk of total hip replacement surgery and temporal trends in utilisation: A population-based analysis.

Bohensky M, Ackerman I, de Steiger R, Gorelik A, Brand C, Adjunct.

Objective: To investigate lifetime risk of total hip replacement surgery (THR) in the state of Victoria, Australia and describe temporal trends in THR incidence.

Methods: We analysed a retrospective, population-based longitudinal cohort of patients who received a primary THR in Victoria from 1998 to 2009. Factors potentially contributing to changes in lifetime risk were also examined, including temporal changes in THR incidence according to healthcare setting (public versus private), socio-economic status (SES) and geographic location (regional versus metropolitan).

Results: We identified 45,775 patients receiving THR over the time period. For a female aged 20-29 years, the mortality-adjusted lifetime risk rose significantly over time from 8.49% (95% CI: 8.23%-8.69%) in 1999-2000 to 10.30% (95% CI: 10.07%-10.49%) in 2007-2008. For a male aged 20-29 years, the mortality-adjusted lifetime risk also increased significantly from 9.29% (95% CI: 8.97%-9.58%) in 1999-2000 to 10.27% (95% CI: 9.95%-10.48%) in 2004-05 but in contrast to the pattern observed for females, decreased slightly in 2007-08 (9.90%, 95% CI: 9.60%-10.16%). We also identified an increasing number of THRs in private hospitals, for people in middle and low socio-economic groups and in rural areas.

Conclusion: The lifetime risk of THR for women was similar to males, despite a higher burden of hip OA and this warrants further investigation. However, increases in the number of THR procedures performed for patients in regional areas and in lower socio-economic groups suggest some reductions over time in known disparities. © 2013 American College of Rheumatology.

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KEYWORDS: Arthroplasty, access to care, epidemiology, osteoarthritis PMID: 24470344

Knee/ACL

Laxity

Am J Sports Med. 2014 Feb;42(2):312-9. doi: 10.1177/0363546513509961. Epub 2013 Nov 25.

Diagnostic value of knee arthrometry in the prediction of anterior cruciate ligament strain during landing.

Kiapour AM, Wordeman SC, Paterno MV, Quatman CE, Levine JW, Goel VK, Demetropoulos CK, Hewett TE.

BACKGROUND: Previous studies have indicated that higher knee joint laxity may be indicative of an increased risk of anterior cruciate ligament (ACL) injuries. Despite the frequent clinical use of knee arthrometry in the evaluation of knee laxity, little data exist to correlate instrumented laxity measures and ACL strain during dynamic high-risk activities. **Purpose/ HYPOTHESES:** The purpose of this study was to evaluate the relationships between ACL strain and anterior knee laxity measurements using arthrometry during both a drawer test and simulated bipedal landing (as an identified high-risk injurious task). We hypothesized that a high correlation exists between dynamic ACL strain and passive arthrometry displacement. The secondary hypothesis was that anterior knee laxity quantified by knee arthrometry is a valid predictor of injury risk such that specimens with greater anterior knee laxity would demonstrate increased levels of peak ACL strain during landing.

METHODS: Twenty cadaveric lower limbs (mean age, 46 ± 6 years; 10 female and 10 male) were tested using a CompuKT knee arthrometer to measure knee joint laxity. Each specimen was tested under 4 continuous cycles of anterior-posterior shear force (± 134 N) applied to the tibial tubercle. To quantify ACL strain, a differential variable reluctance transducer (DVRT) was arthroscopically placed on the ACL (anteromedial bundle), and specimens were retested. Subsequently, bipedal landing from 30 cm was simulated in a subset of 14 specimens (mean age, 45 ± 6 years; 6 female and 8 male) using a novel custom-designed drop stand. Changes in joint laxity and ACL strain under applied anterior shear force were statistically analyzed using paired sample t tests and analysis of variance. Multiple linear regression analyses were conducted to determine the relationship between anterior shear force, anterior tibial translation, and ACL strain.

RESULTS: During simulated drawer tests, 134 N of applied anterior shear load produced a mean peak anterior tibial translation of 3.1 ± 1.1 mm and a mean peak ACL strain of $4.9\% \pm 4.3\%$. Anterior shear load was a significant determinant of anterior tibial translation ($P < .0005$) and peak ACL strain ($P = .04$). A significant correlation ($r = 0.52$, $P < .0005$) was observed between anterior tibial translation and ACL strain. Cadaveric simulations of landing produced a mean axial impact load of 4070 ± 732 N. Simulated landing significantly increased the mean peak anterior tibial translation to 10.4 ± 3.5 mm and the mean peak ACL strain to $6.8\% \pm 2.8\%$ ($P < .0005$) compared with the prelanding condition. Significant correlations were observed between peak ACL strain during simulated landing and anterior tibial translation quantified by knee arthrometry.

CONCLUSION: Our first hypothesis is supported by a significant correlation between arthrometry displacement collected during laxity tests and concurrent ACL strain calculated from DVRT measurements. Experimental findings also support our second hypothesis that instrumented measures of anterior knee laxity predict peak ACL strain during landing, while specimens with greater knee laxity demonstrated higher levels of peak ACL strain during landing.

CLINICAL RELEVANCE: The current findings highlight the importance of instrumented anterior knee laxity assessments as a potential indicator of the risk of ACL injuries in addition to its clinical utility in the evaluation of ACL integrity. **KEYWORDS:** ACL, arthrometry, injury, knee, laxity

Quads and Hamstrings ACL

J Orthop Sports Phys Ther. 2014 Feb;44(2):76-84. doi: 10.2519/jospt.2014.4876. Epub 2013 Nov 21.

Differences in neuromuscular control and quadriceps morphology between potential copers and noncopers following anterior cruciate ligament injury.

Macleod TD1, Snyder-Mackler L, Buchanan TS.

Abstract

Study Design Prospective cross-sectional study. **Objectives** To compare knee muscle morphology and voluntary neuromuscular control in individuals who sustained an anterior cruciate ligament (ACL) injury and were identified as being capable of avoiding surgery (potential copers) and those who were recommended for surgery (noncopers), within 6 months of injury. **Background** Quadriceps atrophy and poor neuromuscular control have been found in noncopers. However, the reasons why some noncopers may be able to avoid surgery remain elusive.

Methods Twenty participants (10 ACL-deficient noncopers and 10 ACL-deficient potential copers) were included in this study. Axial spin-echo, T1-weighted magnetic resonance imaging data of the lower extremities were captured. The volume and maximum cross-sectional area (CSA) of each muscle of the quadriceps and hamstrings were calculated following digital reconstruction. In addition, voluntary neuromuscular control was evaluated using an established target-matching task that required participants to produce static isometric loads across the knee joint. Electromyography was acquired from 5 muscles as participants performed the target-matching task. Circular statistics were used to calculate a specificity index to describe how well focused each muscle was activated toward its primary direction of muscle action. The ACL-deficient limb was then compared to the uninvolved limb of the noncopers and potential copers. **Results** The vasti (vastus medialis and vastus intermedius) of the involved limb of the noncopers were significantly smaller ($P < .031$) in comparison to those of their uninvolved limb. The potential copers' vastus lateralis maximum CSA ($P = .047$), total quadriceps muscle volume ($P = .020$) and maximum CSA ($P = .015$), and quadriceps-hamstring ratio volume ($P = .021$) and maximum CSA ($P = .007$) demonstrated quadriceps atrophy. However, only the ACL-deficient limb of the older (mean \pm SD age, 27.4 ± 11.4 versus 19.9 ± 3.3 years; $P = .032$) and lower-activity-level (3.3 ± 0.5 versus 3.6 ± 0.5 ; $P = .098$) noncoper group demonstrated reduced rectus femoris ($P = .057$) and lateral hamstring ($P = .064$) neuromuscular control in comparison to their uninvolved limb.

Conclusion These findings suggest that quadriceps and hamstring muscle function, rather than muscle size, may be an important factor in the varied response early after ACL injury. J Orthop Sports Phys Ther 2014;44(2):76-84. Epub 21 November 2013. doi:10.2519/jospt.2014.4876.

PMID: 24261930

Return to sport after ACL

Am J Sports Med. 2014 Feb;42(2):336-42. doi: 10.1177/0363546513508762. Epub 2013 Nov 6.

A qualitative investigation of the decision to return to sport after anterior cruciate ligament reconstruction: to play or not to play.

Tjong VK, Murnaghan ML, Nyhof-Young JM, Ogilvie-Harris DJ.
Author information

Abstract

BACKGROUND:

Primary anterior cruciate ligament (ACL) reconstruction is known to have excellent outcomes, but many patients do not return to their preinjury level of sport participation. Previous studies have used subjective outcome scores to evaluate this discrepancy, but none to date has used qualitative, in-depth patient interviews.

PURPOSE: To understand the factors influencing a patient's decision to return to his or her preinjury level of sport after ACL reconstruction.

HYPOTHESIS: Extrinsic and intrinsic factors may affect one's decision to return to sport after primary ACL reconstruction despite good functional knee scores.

STUDY DESIGN: Case series; Level of evidence, 4.

METHODS: An experienced interviewer conducted qualitative, semistructured interviews of 31 patients, aged 18 to 40 years, who had undergone primary ACL reconstruction surgery. All participated in sport before injury and had a minimum 2-year follow-up with no further surgeries or knee injuries. Qualitative analysis was then performed to derive codes, categories, and themes. An assessment of preinjury and current sport participation by type, level of competition, and Marx activity score, along with patient-reported knee function, was also conducted.

RESULTS: Patient interviews revealed 3 overarching themes: fear, lifestyle changes, and innate personality traits. Elements of these factors were shown to largely influence the decision to return to the preinjury sport both in those patients who had returned and those who had not returned to sport. Less common factors included the surgeon's advice not to return, depressed mood, and persistent knee pain.

CONCLUSION: Patients who did not return to their preinjury level of sport after primary ACL reconstruction despite having good knee function were largely influenced by fear, shifts in priority, and individual personalities. This study highlights the importance for treating physicians to recognize and address psychological factors and lifestyle changes that largely contribute to a patient's postoperative decision to return to sport. Results from this study will allow surgeons and health care professionals to educate patients contemplating surgery and to better understand the recovery process not only from sport-related surgeries but other surgical interventions with the goal of returning to activity.

KEYWORDS: anterior cruciate ligament reconstruction, fear of reinjury, qualitative interviews, return to sport

Absorption during landing

J Athl Train. 2013 Nov-Dec;48(6):757-63. doi: 10.4085/1062-6050-48.4.10. Epub 2013 Aug 14.

Lower extremity energy absorption and biomechanics during landing, part II: frontal-plane energy analyses and interplanar relationships.

Norcross MF, Lewek MD, Padua DA, Shultz SJ, Weinhold PS, Blackburn JT.

CONTEXT:

Greater sagittal-plane energy absorption (EA) during the initial impact phase (INI) of landing is consistent with sagittal-plane biomechanics that likely increase anterior cruciate ligament (ACL) loading, but it does not appear to influence frontal-plane biomechanics. We do not know whether frontal-plane INI EA is related to high-risk frontal-plane biomechanics.

OBJECTIVE:

To compare biomechanics among INI EA groups, determine if women are represented more in the high group, and evaluate interplanar INI EA relationships.

DESIGN: Descriptive laboratory study.

SETTING: Research laboratory.

PATIENTS OR OTHER PARTICIPANTS:

Participants included 82 (41 men, 41 women; age = 21.0 ± 2.4 years, height = 1.74 ± 0.10 m, mass = 70.3 ± 16.1 kg) healthy, physically active volunteers.

INTERVENTION(S):

We assessed landing biomechanics with an electromagnetic motion-capture system and force plate.

MAIN OUTCOME MEASURE(S):

We calculated frontal- and sagittal-plane total, hip, knee, and ankle INI EA. Total frontal-plane INI EA was used to create high, moderate, and low tertiles. Frontal-plane knee and hip kinematics, peak vertical and posterior ground reaction forces, and peak internal knee-varus moment (pKVM) were identified and compared across groups using 1-way analyses of variance. We used a χ^2 analysis to evaluate male and female allocation to INI EA groups. We used simple, bivariate Pearson product moment correlations to assess interplanar INI EA relationships.

RESULTS:

The high-INI EA group exhibited greater knee valgus at ground contact, hip adduction at pKVM, and peak hip adduction than the low-INI EA group ($P < .05$) and greater peak knee valgus, pKVM, and knee valgus at pKVM than the moderate- ($P < .05$) and low- ($P < .05$) INI EA groups. Women were more likely than men to be in the high-INI EA group ($\chi^2(2) = 4.909$, $P = .03$). Sagittal-plane knee and frontal-plane hip INI EA ($r = 0.301$, $P = .006$) and sagittal-plane and frontal-plane ankle INI EA were associated ($r = 0.224$, $P = .04$). No other interplanar INI EA relationships were found ($P > .05$).

CONCLUSIONS:

Greater frontal-plane INI EA was associated with less favorable frontal-plane biomechanics that likely result in greater ACL loading. Women were more likely than men to use greater frontal-plane INI EA. The magnitudes of sagittal- and frontal-plane INI EA were largely independent.

PMID: 23944381

Meniscus

Body fat and impact on cartilage

Knee-Joint Loading in Knee Osteoarthritis: Influence of Abdominal and Thigh Fat

Messier, Stephen P.; Beavers, Daniel P.; Loeser, Richard F.; Jeffery Carr, J.; Khajanchi, Shubham; Legault, Claudine; Nicklas, Barbara J.; Hunter, David J.; DeVita, Paul

**Medicine and Science in Sports and Exercise, 02/07/2014 Evidence Based
Medicine Clinical Article**

Abstract

Purpose: Using three separate models that included total body mass, total lean and total fat mass, and abdominal and thigh fat as independent measures, we determined their association with knee-joint loads in older overweight and obese adults with knee osteoarthritis (OA).

Methods: Fat depots were quantified using computed tomography and total lean and fat mass determined with dual energy x-ray absorptiometry in 176 adults (age = 66.3 yr., BMI = 33.5 kg.m⁻²) with radiographic knee OA. Knee moments and joint bone-on-bone forces were calculated using gait analysis and musculoskeletal modeling.

Results: Higher total body mass was significantly associated ($p \leq 0.0001$) with greater knee compressive and shear forces, compressive and shear impulses ($p < 0.0001$), patellofemoral forces ($p < 0.006$), and knee extensor moments ($p = 0.003$). Regression analysis with total lean and total fat mass as independent variables revealed significant positive associations of total fat mass with knee compressive ($p = 0.0001$), shear ($p < 0.001$), and patellofemoral forces ($p = 0.01$) and knee extension moment ($p = 0.008$). Gastrocnemius and quadriceps forces were positively associated with total fat mass. Total lean mass was associated with knee compressive force ($p = 0.002$). A regression model that included total thigh and total abdominal fat found both were significantly associated with knee compressive and shear forces ($p \leq 0.04$). Thigh fat was associated with the knee abduction ($p = 0.03$) and knee extension moment ($p = 0.02$).

Conclusions: Thigh fat, consisting predominately of subcutaneous fat, had similar significant associations with knee joint forces as abdominal fat despite its much smaller volume and could be an important therapeutic target for people with knee OA.

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Meniscus/cartilage

Discoid lateral meniscus tears and concomitant articular cartilage lesions in the knee □

Arthroscopy, 02/28/2014 Evidence Based Medicine Clinical Article

Fu D, et al

Purpose

The purpose of this study was to investigate the relation between isolated discoid lateral meniscus (DLM) tears and the presence of articular cartilage lesions.

Methods

From January 2010 to January 2012, 252 consecutive patients diagnosed with an isolated DLM tear during an arthroscopic procedure were included in this study. Demographic variables, including gender, age, body mass index (BMI), traumatic history, time course, and date of the DLM tear, were recorded. The relation between DLM tears and the presence of articular cartilage lesions was analyzed by the χ^2 test. Logistic regression analysis was used to analyze the relation between these variables and articular cartilage lesions.

Results

Of the patients with DLM tears, 67 (26.6%) also had articular cartilage lesions. The most common type of DLM tear was the complex tear (46.8%). The most common location of articular cartilage lesions was the lateral tibial plateau (11.6%). Lesions on the opposing articular surfaces of the lateral compartment and patellofemoral joint of the knee were found in 12 patients (4.8%) and 11 patients (4.4%), respectively. There were no significant differences in the incidences of articular cartilage lesions in patients with different types of DLM tears ($P > .05$). Gender (odds ratio [OR], 2.289; $P = .012$), BMI (OR, 1.991; $P = .023$), and time course (OR, 2.050; $P = .034$) were significantly associated with articular cartilage lesions.

Conclusions

DLM tears were more common in the context of degenerative tears. There was no significant difference in the incidence of articular cartilage lesions among patients with different types of DLM tears. Female patients, patients with a BMI greater than 23.0 kg/m², or patients with a time course of greater than 6 months were more frequently observed to also have articular cartilage lesions.

Level of Evidence

Level IV, therapeutic case series

Alignment

Surg Radiol Anat. 2014 Feb 11.

The potential effect of anatomic relationship between the femur and the tibia on medial meniscus tears.

Bozkurt M1, Unlu S, Cay N, Apaydin N, Dogan M.

Abstract

BACKGROUND:

The anatomic and the kinematical relationships between the femur and the tibia have been previously examined in both normal and diseased knees. However, less attention has been directed to the effect of these relationships on the meniscal diseases. Therefore, we aimed to investigate the impact of femorotibial incongruence on both lateral and medial meniscal tears.

MATERIALS AND METHODS:

A total of 100 images obtained from MRI of 100 patients (39 males and 61 females) were included in the study. Diameters of the medial and the lateral femoral condyles, thicknesses of the menisci, and diameters of the medial and the lateral tibial articular surfaces were measured.

RESULTS:

The medial meniscus tear was detected in 40 (40 %) patients. However, no lateral meniscus tear was found. Significant relationships were found between the diameters of the posterior medial femoral condyle and the medial tibial superior articular surface and between the diameters of the posterior lateral femoral condyle and the lateral tibial superior articular surface. The mean values for the diameter of the medial condyle of the femur, the lateral condyle of the femur, the medial superior articular surface of the tibia, and the lateral superior articular surface of the tibia were found to be significantly higher in cases with meniscus tear compared to cases without meniscus tear. However, no significant difference was present regarding the thicknesses of the medial and the lateral menisci. A positive relationship between the diameter of the posterior medial femoral condyle and the tibial medial superior articular surface was found in cases with (n = 40) ($r^2 = 0.208$, $p = 0.003$) and without tear (n = 60) ($r^2 = 0.182$, $p = 0.001$). In addition, a significant positive relationship was found between the diameter of the posterior medial femoral condyle and the medial tibial superior articular surface in cases with and without tear.

CONCLUSION:

The impact of femorotibial incongruence on the medial meniscus tear is important for the understanding of the lesions.

PMID: 24515288

Impact of Varus knee on cartilage

Skeletal Radiol. 2014 Apr;43(4):437-41. doi: 10.1007/s00256-013-1800-7. Epub 2014 Jan 12.

Increasing lateral tibial slope: is there an association with articular cartilage changes in the knee?

Khan N1, Shepel M, Leswick DA, Obaid H.

Abstract

PURPOSE:

The geometry of the lateral tibial slope (LTS) plays an important role in the overall biomechanics of the knee. Through this study, we aim to assess the impact of LTS on cartilage degeneration in the knee.

MATERIALS AND METHODS:

A retrospective analysis of 93 knee MRI scans (1.5 T or 3 T) for patients aged 20-45 years with no history of trauma or knee surgery, and absence of internal derangement. The LTS was calculated using the circle method. Chondropathy was graded from 0 (normal) to 3 (severe). Linear regression analysis was used for statistical analysis ($p < 0.05$).

RESULTS:

In our cohort of patients, a statistically significant association was seen between increasing LTS and worsening cartilage degenerative changes in the medial patellar articular surface and the lateral tibial articular surface ($p < 0.05$). There was no statistically significant association between increasing LTS and worsening chondropathy of the lateral patellar, medial trochlea, lateral trochlea, medial femoral, lateral femoral, and medial tibial articular surfaces.

CONCLUSIONS:

Our results show a statistically significant association between increasing LTS and worsening cartilage degenerative changes in the medial patella and the lateral tibial plateau. We speculate that increased LTS may result in increased femoral glide over the lateral tibial plateau with subsequent increased external rotation of the femur predisposing to patellofemoral articular changes. Future arthroscopic studies are needed to further confirm our findings.

PMID: 24414035

Lateral meniscus/ACL

Am J Sports Med. 2014 Feb;42(2):327-35. doi: 10.1177/0363546513508374. Epub 2013 Dec 4.

Clinical, radiological, and morphological evaluations of posterior horn tears of the lateral meniscus left in situ during anterior cruciate ligament reconstruction.

Lee DW, Jang HW, Lee SR, Park JH, Ha JK, Kim JG.
Author information

Abstract

BACKGROUND: Recent studies have shown that lateral menisci have a higher healing potential and that they can be treated successfully without symptoms by being left in situ during anterior cruciate ligament (ACL) reconstruction. However, few studies have reported morphological results.

HYPOTHESIS:

Stable posterior horn tears of the lateral meniscus left in situ during ACL reconstruction could be healed spontaneously and would result in not only successful clinical outcomes but also morphological restoration.

STUDY DESIGN: Cohort study; Level of evidence, 3.

METHODS:

Among 367 patients who underwent primary ACL reconstruction between 2008 and 2010, 53 patients who had lateral meniscus tears that were left in situ were analyzed. These patients were evaluated subjectively and radiologically and compared with a matched control group that underwent ACL reconstruction without any other structural disorders. Of the 53 patients with stable posterior horn tears of the lateral meniscus left in situ, 28 patients were assessed by second-look arthroscopic surgery and magnetic resonance imaging (MRI).

RESULTS:

The mean follow-up of the study group and the control group was 36.47 and 37.26 months, respectively. There were no statistical differences in postoperative clinical outcomes between the 2 groups. Clinical results of both groups including the Lysholm score, Tegner activity score, and International Knee Documentation Committee (IKDC) score significantly improved. In the subgroup composed of 28 patients, follow-up MRI showed 25 (89%) and 24 (86%) healed menisci in sagittal and coronal views, respectively. Twenty-one (75%) were considered to be completely healed, and 5 (18%) were incompletely healed on second-look arthroscopic surgery.

CONCLUSION:

Stable posterior horn tears of the lateral meniscus left in situ at the time of ACL reconstruction revealed successful clinical outcomes compared with isolated ACL injuries and showed considerable healing and functional restoration of tears with repeat MRI and second-look arthroscopic surgery. Therefore, leaving stable posterior horn tears of the lateral meniscus in situ during ACL reconstruction should be considered.

Meniscus shape

Arthritis Res Ther. 2014 Jan 28;16(1):R27.

The relationship between lateral meniscus shape and joint contact parameters in the knee: a study using data from the Osteoarthritis Initiative.

Zhang KY, Kedgley AE, Donoghue CR, Rueckert D, Bull AM.

Abstract

INTRODUCTION:

The meniscus has an important role in force transmission across the knee, but a detailed three-dimensional (3D) morphometric shape analysis of the lateral meniscus to elucidate subject-specific function has not been conducted. The aim of this study was to perform 3D morphometric analyses of the lateral meniscus in order to correlate shape variables with anthropometric parameters, thereby gaining a better understanding of the relationship between lateral meniscus shape and its load-bearing function.

METHODS:

The lateral meniscus (LM) was manually segmented from magnetic resonance images randomly selected from the Osteoarthritis Initiative (OAI) non-exposed control subcohort. A 3D statistical shape model (SSM) was constructed to extract the principal morphological variations (PMV) of the lateral meniscus for 50 subjects (25 male and 25 female). Correlations between the principal morphological variations and anthropometric parameters were tested. Anthropometric parameters that were selected included height, weight, body mass index (BMI), femoral condyle width and axial rotation.

RESULTS:

The first principal morphological variation (PMV) was found to correlate with height ($r = 0.569$), weight ($r = 0.647$), BMI ($r = 0.376$), and femoral condyle width ($r = 0.622$). The third PMV was found to correlate with height ($r = 0.406$), weight ($r = 0.312$), and femoral condyle width ($r = 0.331$). The percentage of the tibial plateau covered by the lateral meniscus decreases as anthropometric parameters relating to size of the subject increase. Furthermore, when the size of the subject increases, the posterior and anterior horns become longer and wider.

CONCLUSION:

The correlations discovered suggest that variations in meniscal shape can be at least partially explained by the levels of loads transmitted across the knee on a regular basis. Additionally, as the size of the subject increases and body weight rises, the coverage percentage of the meniscus is reduced, suggesting that there would be an increase in the load-bearing by the cartilage. However, this reduced coverage percentage is compensated by the proportionally wider and longer meniscal horn.

PMID: 24467794

Location of tear

Ir J Med Sci. 2014 Mar;183(1):23-31. doi: 10.1007/s11845-013-0965-3. Epub 2013 May 12.

The location of knee pain and pathology in patients with a presumed meniscus tear: preoperative symptoms compared to arthroscopic findings.

Campbell J, Harte A, Kerr DP, Murray P.

Author information

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Abstract

BACKGROUND:

Pain is one of the primary motivations for patients to seek medical advice. Pain location is one element in the process of formulating a diagnosis.

AIMS:

The purpose of the study is to determine if there is a correlation between the location of pain and the location of pathology in the knees of patients with a suspected meniscus tear.

METHODS:

From a possible 856 patients referred for arthroscopy, 213 patients consented to be included in the study and 193 (90 %) completed the study. The participating subjects located area of their symptoms on a diagram showing the four aspects of the knee joint. For analysis purposes symptoms were grouped into medial, lateral, posterior, or a combination of these areas. Pathology identified at arthroscopy was recorded on the International Knee Documentation Committee (IKDC) surgical form. The location of knee pathology was divided into medial compartment, lateral compartment or combinations of pathologies. Locations of pain were analysed for an association with the location of pathology found at arthroscopy.

RESULTS:

Of the 193 subjects who completed the study, 69 (35.7 %) of the subjects presented with one location of pain i.e. medial, lateral or posterior pain and the remaining 124 (64.3 %) had multiple areas. In correlating locations of reported pain with pathology, there was no significant correlation found ($p = 0.98$).

CONCLUSIONS:

This study found no direct correlation between the location of pain and the location of pathology in the knee in patients with a suspected meniscus tear.

PMID: 23666820

Meniscus pliability

Research article

Meniscus body position and its change over four years in asymptomatic adults: a cohort study using data from the Osteoarthritis Initiative (OAI)

Katharina Bruns, Fredrik Svensson, Aleksandra Turkiewicz, Wolfgang Wirth, Ali Guermazi, Felix Eckstein and Martin Englund

BMC Musculoskeletal Disorders 2014, **15**:32 doi:10.1186/1471-2474-15-32

Background

A high degree of meniscal body extrusion on knee magnetic resonance imaging has been shown to be strongly associated with development of knee osteoarthritis. However, very little is known about meniscal position in the asymptomatic knee and its natural history. Hence our objective was to study meniscal body position and its change over 4 years in asymptomatic adults.

Methods

Cohort study using data from the Osteoarthritis Initiative (OAI) involving four clinical sites in United States (Baltimore, Maryland, Pawtucket, Rhode Island, Columbus, Ohio, and Pittsburgh, Pennsylvania). We studied both knees from 118 subjects (mean age 55 years, 61% women, mean body mass index 24.4) from the OAI "non-exposed" reference cohort free of knee pain, radiographic knee osteoarthritis and risk factors for knee osteoarthritis at baseline. We assessed mid-coronal intermediate-weighted 3-Tesla magnetic resonance images from baseline and the 2- and 4-year follow-up visit. One observer measured tibia plateau, meniscal body width and meniscal body extrusion in both compartments. We calculated meniscal overlap distance on the tibial plateau, % coverage, and extrusion index compared to tibia width. Potential trends in position over the 4-year period were evaluated using a linear mixed-effects regression model.

Results

The mean (SD) values at baseline for medial meniscal body extrusion and overlap distance were 1.64 mm (0.92) and 10.1 mm (3.5), and coverage was 34.4% (11.9). The corresponding values for the lateral compartment were 0.63 mm (0.73), 9.8 mm (2.4), and 31.0% (7.7). Medial meniscus body extrusion index was greater in female knees ($p = 0.03$). There was slight increase in medial meniscal body extrusion over 4 years (0.040 mm/year [95% CI: 0.019-0.062]). The other variables were relatively stable.

Conclusion

In asymptomatic adults, the relative degree of meniscus body extrusion is more pronounced in female knees. Although a slight increase in extrusion over time was noted for the medial body, positions were relatively stable within subjects over time.

Types of posterior horn tears

Clin Orthop Surg. 2011 Jun;3(2):128-32. doi: 10.4055/cios.2011.3.2.128. Epub 2011 May 12.

Characteristics of radial tears in the posterior horn of the medial meniscus compared to horizontal tears.

Choi CJ, Choi YJ, Song IB, Choi CH.

Abstract

BACKGROUND:

The clinical and radiologic features of radial tears of the medial meniscus posterior horn were compared with those of horizontal tears.

METHODS:

From January 2007 to December 2008, 387 consecutive cases of medial meniscal tears were treated arthroscopically. Among these, 91 were radial tears in the medial meniscus posterior horn, and 95 were horizontal tears in the posterior segment of the medial meniscus. The patients' data (age, gender, duration of symptom, body mass index, and injury history), radiographic findings (Kellgren and Lawrence score, posterior tibial slope, and femorotibial angle), and chondral lesions were recorded.

RESULTS:

The patient factors of age, gender, and body mass index were related to radial tears of the medial meniscus posterior horn. Radial tears were significantly correlated with Kellgren and Lawrence score, varus alignment, posterior tibial slope, and severity of the chondral lesion.

CONCLUSIONS:

Radial tears of the medial meniscus posterior horn are a unique clinical entity that are associated with older age, females and obesity, and are strongly associated with an increased incidence and severity of cartilage degeneration compared to horizontal tears.

KEYWORDS: Horizontal tear, Medial meniscus, Posterior horn, Radial tear PMID: 21629473

Patella

Step length with PFP

Clin Biomech (Bristol, Avon). 2013 Dec 30. pii: S0268-0033(13)00337-9. doi: 10.1016/j.clinbiomech.2013.12.016.

Effects of step length on patellofemoral joint stress in female runners with and without patellofemoral pain.

Willson JD¹, Sharpee R², Meardon SA³, Kernozek TW².

Author information

Abstract

BACKGROUND:

Patellofemoral pain is common among runners and is frequently attributed to increased patellofemoral joint stress. The purpose of our study was to examine the effects of changing step length during running on patellofemoral joint stress per step and stress per mile in females with and without patellofemoral pain.

METHODS:

Ten female runners with patellofemoral pain and 13 healthy female runners performed running trials at 3.7m/s in three conditions: preferred step length, at least +10% step length, and at least -10% step length. Knee flexion angles and internal knee extension moments served as inputs for a biomechanical model to estimate patellofemoral joint stress per step. We also estimated total patellofemoral joint stress per mile based on the number of steps necessary to run a mile during each condition.

FINDINGS:

Patellofemoral joint stress per step increased 31% in the long step length condition ($P<.001$) and decreased 22.2% in the short step length condition ($P<.001$). Despite the inverse relationship between step length and number of steps required to run a mile, patellofemoral joint stress per mile increased 14% in the long step length condition ($P<.001$) and decreased 7.5% in the short step length condition ($P<.001$).

INTERPRETATION:

These results suggest a direct relationship between step length and patellofemoral joint loads. Total stress per mile experienced at the patellofemoral joint decreased with a short step length despite the greater number of steps necessary to cover this distance. These findings may have relevance with respect to both prevention and treatment of patellofemoral joint pain.

Proximal exercises for PF pain

Int J Sports Phys Ther. 2013 Oct;8(5):689-700.

Proximal exercises are effective in treating patellofemoral pain syndrome: a systematic review.

Peters JS1, Tyson NL.

Abstract

BACKGROUND:

Patellofemoral pain syndrome is a common disorder of the knee with multifactorial aetiology. Multimodal treatment, including exercise therapy, has been shown to be effective in the treatment of patellofemoral pain, although some patients continue to experience pain and dysfunction despite treatment. To address this, recent research has started to investigate the lumbo-pelvic and hip girdle in patellofemoral pain.

PURPOSE:

The aim of this systematic review was to investigate the effectiveness of proximal exercises, compared with knee exercises, for patients with patellofemoral pain, in improving pain and function.

METHODS:

A computer-based search (population: patients with patellofemoral pain, intervention: proximal [hip or lumbo-pelvic] exercises, comparator: knee exercises, outcome: self-reported pain and/or functional questionnaire) was undertaken. Medline, Embase, CINAHL, SportsDiscus, Cochrane Library and PEDro were searched for studies published between January 2011 and January 2013. The included studies were appraised independently using the McMaster Critical Review Form for Quantitative Studies. Data was extracted for the exercise prescription and applicable outcome measures, and a descriptive analysis undertaken.

RESULTS:

Eight studies (three randomized controlled trials, one clinical controlled trial, three cohort studies and one case series) of moderate to high methodological quality met the inclusion criteria. Proximal exercise programs showed a consistent reduction of pain and function in the treatment of patellofemoral pain. Knee exercise programs had variable outcomes.

CONCLUSION:

Proximal interventions provide relief of pain and improved function in the short and long term and therefore physical therapists should consider using proximal interventions for treatment of patellofemoral pain.

LEVEL OF EVIDENCE: 3a.

KEYWORDS: exercise, hip, knee, patellofemoral pain syndrome. PMID: 24175148

Knee/total

Patella position

Knee Surgery, Sports Traumatology, Arthroscopy
February 2014

Does patella position influence ligament balancing in total knee arthroplasty?

Jung-Ro Yoon, Kwang-Jun Oh, Joon Ho Wang, Jae-Hyuk Yang

Abstract

Purpose

In vivo comparative gap measurements were performed in three different patella positions (reduced, subluxated and everted) using offset-type-force-controlled-spreader-system.

Methods

Prospectively, 50 knees were operated by total knee arthroplasty using a navigation-assisted gap-balancing technique. The offset-type-force-controlled-spreader-system was used for gap measurements. This commercially available instrument allows controllable tension in patella-reduced position. The mediolateral gaps of knee extension (0°) and flexion (90°) angle were recorded in three different patella positions; reduced, subluxated and everted. Any gap differences of more than 3 mm were considered as a meaningful difference. Correlation between the difference with the demographic data, preoperative radiologic alignment and intraoperative data was analysed. For statistical analysis, ANOVA and Pearson's correlation test were used.

Results

The gaps in patella eversion demonstrated smaller gaps both in knee extension and flexion position compared to the gaps of patella reduction position. The amount of decreased gaps was more definite in knee flexion position. Statistically significant difference was observed for the lateral gap of patella eversion compared to gap of patella reduction in knee flexion position ($p < 0.05$). There were notable cases of variability in knee flexion position. Significant portion of 12 (24 %) knees of patella subluxation and 33 (66 %) knees of patella eversion demonstrated either increased or decreased gaps in knee flexion position compared to the gaps of patella reduction position.

Conclusion

The gaps in patella eversion demonstrated smaller gaps both in knee extension and flexion position compared to the gaps of patella reduction position. The amount of decreased gaps was more definite in knee flexion position. Therefore, the intraoperative patellar positioning has influence on the measurement of the joint gap. Keeping the patella in reduced position is important during gap balancing.

Level of evidence I

Predictors of outcomes

Am J Phys Med Rehabil. 2014 Feb 6.

Predicting Functional Performance and Range of Motion Outcomes After Total Knee Arthroplasty.

Bade MJ, Kittelson JM, Kohrt WM, Stevens-Lapsley JE.

Abstract

OBJECTIVE:

The aim of this study was to assess the predictive value of functional performance and range of motion measures on outcomes after total knee arthroplasty.

DESIGN:

This is a secondary analysis of two pooled prospective randomized controlled trials. Sixty-four subjects (32 men and 32 women) with end-stage knee osteoarthritis scheduled to undergo primary total knee arthroplasty were enrolled. Active knee flexion and extension range of motion, Timed Up and Go (TUG) test time, and 6-min walk test distance were assessed.

RESULTS:

Preoperative measures of knee flexion and extension were predictive of long-term flexion ($\beta = 0.44$, $P < 0.001$) and extension ($\beta = 0.46$, $P < 0.001$). Acute measures of knee flexion and extension were not predictive of long-term flexion ($\beta = 0.09$, $P = 0.26$) or extension ($\beta = 0.04$, $P = 0.76$). Preoperative TUG performance was predictive of long-term 6-min walk performance ($\beta = -21$, $P < 0.001$). Acute TUG performance was predictive of long-term functional performance on the 6-min walk test, after adjusting for the effects of sex and age ($P = 0.02$); however, once adjusted for preoperative TUG performance, acute TUG was no longer related to long-term 6-min walk performance ($P = 0.65$).

CONCLUSIONS:

Acute postoperative measures of knee range of motion are of limited prognostic value, although preoperative measures have some prognostic value. However, acute measures of functional performance are of useful prognostic value, especially when preoperative functional performance data are unavailable.

Use of ice

PM R. 2014 Feb 14. pii: S1934-1482(14)00072-0. doi: 10.1016/j.pmrj.2014.02.004.

The Use of Focal Knee Joint Cryotherapy to Improve Functional Outcomes After Total Knee Arthroplasty.

Ewell M1, Griffin C2, Hull J1.

Abstract

The purpose of this study was to review and synthesize available evidence on the effect of focal knee joint cryotherapy on quadriceps arthrogenic muscle inhibition and discuss the implications of the findings regarding the use of this modality for patients following a total knee arthroplasty. An electronic literature search was completed on the PubMed, CINAHL, ScienceDirect, and OvidSP databases that targeted peer reviewed journals. An article was included when it was determined that the article was relevant to the topic of focal knee joint cryotherapy and its effect on quadriceps muscle function. There were six studies that met the inclusion criteria. Of the reviewed studies, effect sizes for quadriceps activation ranged from very small to large. Five of the six studies observed medium to large effects. Effects sizes for quadriceps torque and force production ranged from no effect to a large effect. Two of the five studies with outcome measures related to quadriceps torque or force production observed medium and large effects.

This evidence suggests that focal joint cooling of the knee shows the potential to improve quadriceps activation as well as quadriceps torque and force production in patients with AMI. With quadriceps AMI being an impairment commonly observed in patient following a TKA, the evidence uncovered in this review suggest that this patient population may be positively impacted by the use of this modality to improve quadriceps activation as well as quadriceps torque and force production.

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PMID: 24534102

Lower leg alignment non and weight bearing

Knee Surg Sports Traumatol Arthrosc. 2013 Sep 20.

The difference between weight-bearing and non-weight-bearing alignment in patient-specific instrumentation planning.

Paternostre F, Schwab PE, Thienpont E.

Abstract

PURPOSE:

Retrospective study to analyse the difference between weight-bearing and non-weight-bearing alignment in osteoarthritic knees planned for patient-specific instrumented (PSI) total knee arthroplasty (TKA). The aim of the study is to observe whether a difference in alignment can be linked to arthritis staging or zone mechanical axis.

METHODS:

Full-leg standing radiographs and non-weight-bearing MRI of the whole leg were compared for hip-knee-ankle (HKA) angle, measured according to Moreland criteria, in seventy osteoarthritic patients. Kellgren-Lawrence (KL) staging and classification according to zone mechanical axis with Kennedy zones was done.

RESULTS:

A mean preoperative HKA angle on standing radiographs of $176.4^\circ \pm 7.2^\circ$ was measured compared to $176.4^\circ \pm 6.9^\circ$ for the MRI whole-leg HKA angle. A difference of 0° - 1° was observed in 54 % of patients when comparing the weight-bearing with the non-weight-bearing HKA angle. Twenty-three per cent had a difference of 2° and another 23 % a difference of 3° or more. In female patients, the dynamic load pattern of weight-bearing increases the HKA angle due to convex side soft tissue laxity both in varus and valgus knees. More important differences were observed in the KL stage 3 and 4 patients ($P < 0.05$) and with a load-bearing axis outside of the articular surface ($P < 0.05$).

CONCLUSION:

Surgeons should be aware that there is a difference between weight-bearing and non-weight-bearing alignment in patients with Kellgren-Lawrence 3 and 4 with a load-bearing axis outside of the articular surface (Kennedy 0 or 1 or 5). According to this study, these changes seem related to the amount of articular wear and the load-bearing axis. This is important for the preoperative planning process in PSI-assisted TKA. More concave side ligamentous release or more constraint can be necessary than imagined based on the PSI alignment result. Full-leg standing radiographs should be performed for PSI-assisted TKAs to analyse the position of the load-bearing axis.

LEVEL OF EVIDENCE: IV.

PMID: 24051507

Pre exercise impact

Knee Surg Sports Traumatol Arthrosc. 2012 Dec 28.

Range of motion after total knee arthroplasty: the effect of a preoperative home exercise program.

Matassi F, Duerinckx J, Vandenneucker H, Bellemans J.

Abstract

PURPOSE:

Preoperative range of motion (ROM) is the most important variable to determine final flexion after total knee arthroplasty (TKA). The purpose of this study was to determine whether a preoperative home exercise program could improve ROM in the arthritic knee and whether this influenced ROM and functional recovery following primary TKA.

METHODS:

During the period between 2005 and 2006, one hundred and twenty-two patients with gonarthrosis were included in a prospective study and randomly allocated to either the control or the treatment group. The sixty-one subjects in the treatment group underwent a 6-week home-based exercise program before TKA surgery. All one hundred and twenty-two patients were assessed before and after this exercise intervention. Postoperative assessments were at 6 weeks, 6 months and 1 year. Each evaluation included knee ROM and the Knee Society Clinical Rating System. Length of hospital stay and postoperative duration before achieving 90° of knee flexion were also recorded.

RESULTS:

Exercise program improves knee motion in the presence of gonarthrosis. After TKA, the patients in the exercise group achieved 90° of knee flexion faster and had a shorter hospital stay. There is no prolonged effect on knee motion or patient function between 6 weeks and 1 year postoperatively.

CONCLUSION:

Preoperative exercise of the arthritic knee facilitates immediate postoperative recovery following primary TKA.

LEVELS OF EVIDENCE: Therapeutic study, Level I. PMID: 23271039

Anxiety disorder impact on results

Evaluating the effects of anxiety disorder on physical and psychosocial measures for indigent patients with severe lower extremity osteoarthritis

Current Orthopaedic Practice , 02/14/2014

Evidence Based Medicine Clinical Article

Wang J, et al.

Abstract

Background:

The purpose of this study was to evaluate the effects of anxiety disorder on preoperative physical and psychosocial measures for patients undergoing lower extremity total joint arthroplasty. It was hypothesized that patients with anxiety disorder would express higher levels of pain, worse function, and worse quality of life indices.

Methods:

Four hundred and four indigent patients undergoing total knee or hip arthroplasty were assessed for anxiety disorder. Patients with anxiety disorder (n=48) were compared with patients without anxiety disorder (n=356) at the univariate level for the Western Ontario and McMaster Universities (WOMAC) score, Knee Society Score, Harris Hip Score, and the Short Form- 36 (SF-36).

Results:

Twenty-eight (10.6%) of 265 patients who had total knee arthroplasty and 20 (14.4%) of 139 patients who had total hip arthroplasty met the criteria for anxiety disorder on the patient health questionnaire. Overall, 48 (11.9%) of 404 patients undergoing total knee or total hip arthroplasty met these criteria for anxiety disorder on the patient health questionnaire. Patients with anxiety disorder were significantly more likely to report greater levels of pain and stiffness along with lower levels of function and quality of life indices before surgery.

Conclusions:

The results of this study support the hypothesis that patients diagnosed with anxiety disorder before undergoing total knee arthroplasty or total hip arthroplasty would report poorer scores on physical and psychosocial measures before surgery. Recognizing how anxiety disorder relates to pain catastrophizing and fear avoidance factors may explain the mechanism for which psychological distress translates into poor function and greater pain.

KNEE/EXERCISE

Knee angle

Med Sci Sports Exerc. 2014 Feb 5.

Neuromuscular Adaptations Associated with Knee Joint Angle-Specific Force Change.

Noorköiv M, Nosaka K, Blazeovich AJ.

Abstract

PURPOSE:

Neuromuscular adaptations to joint angle-specific force increases after isometric training have not yet been fully elucidated. This study examined angle-specific neuromuscular adaptations in response to isometric knee extension training at short (SL; joint angle $38.1 \pm 3.7^\circ$) versus long (LL; $87.5 \pm 6.0^\circ$) muscle lengths.

METHODS:

Sixteen men trained three times a week for six weeks either at SL (n = 8) or LL (n = 8). Voluntary maximal isometric knee extensor (MVC) force, doublet twitch force, electromyogram amplitudes (EMG:Mmax) and voluntary activation during MVC force (VA%) were measured at eight knee joint angles (30-100°) at weeks 0, 3 and 6. Muscle volume and cross-sectional area (CSA) were measured from magnetic resonance imaging scans, and fascicle length (Lf) was assessed using ultrasonography before and after training.

RESULTS:

Clear joint angle specificity of force increase was seen in SL but not in LL. The $13.4 \pm 9.7\%$ (P=0.01) force increase around the training angle in SL was related to changes in VL and VM EMG:Mmax around the training angle ($r=0.84-0.88$, $P<0.05$), without changes in the doublet twitch force-angle relationship or muscle size. In LL, muscle volume and CSA increased and the changes in CSA at specific muscle regions were correlated with changes in MVC force. A $5.4 \pm 4.9\%$ (P = 0.001) increase in Lf found in both groups was not associated with angle-specific force changes. There were no angle-specific changes in VA%.

CONCLUSION:

The EMG:Mmax, although not VA%, results suggest that neural adaptations underpinned training-related changes at short quadriceps lengths but hypertrophic changes predominated after training at long lengths. The findings of this study should contribute to the development of more effective and evidence based rehabilitation and strength training protocols.

PMID: 24504427

Neuromuscular control

Arch Phys Med Rehabil. 2014 Feb 14. pii: S0003-9993(14)00116-6. doi: 10.1016/j.apmr.2014.01.025.

Comparative evaluation of core muscles recruitment pattern in response to sudden external perturbations in patients with patellofemoral pain syndrome and healthy subjects.

Shirazi ZR1, Moghaddam MB2, Motealleh A3.

Author information

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Abstract

OBJECTIVE:

To evaluate the core muscles electromyographic activity in response to unexpected perturbations to the pelvis in patients with patellofemoral pain syndrome (PFPS) and healthy subjects.

DESIGN: Case-control study.

SETTING: Center for Human Motion Science Research.

PARTICIPANTS: 54 women aged 18-40 years, including 27 subjects diagnosed with PFPS and 27 healthy controls, participated in this study.

INTERVENTION:

An unexpected perturbation was applied to the lateral side of the pelvis by pulling a one-kilogram medicine ball back to an angle in which releasing the pendulum applies the energy of 20% of the subject's Body Mass Index (BMI). This intervention was repeated thrice with the minimum of 30 s rest between the trials.

MAIN OUTCOME MEASURE(S):

Electromyographic onsets and durations of the Transversus abdominis(TrA)/Internal oblique(IO), erector spinae(ES), and gluteus medius(GM) muscles were recorded in response to the unexpected lateral perturbation to the pelvis.

RESULTS:

Core muscles recruitment pattern was different between the two groups. In the PFPS subjects, the abdominal muscles and the ES activated significantly earlier and longer, whereas the GM muscle responded significantly later than the controls. The duration of the GM activity was not significantly different between the groups.

CONCLUSIONS:

The results of this investigation propose that the core muscles are recruited differently in PFPS subjects to provide core stability. It appears that core neuromuscular improvement could be an effective strategy in rehabilitation of patients with PFPS.

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OSTEOARTHRITIS/KNEE

Prolotherapy

Arch Phys Med Rehabil. 2013 Nov;94(11):2075-82. doi: 10.1016/j.apmr.2013.06.025. Epub 2013 Jul 10.

Association between disease-specific quality of life and magnetic resonance imaging outcomes in a clinical trial of prolotherapy for knee osteoarthritis.

Rabago D1, Kijowski R, Woods M, Patterson JJ, Mundt M, Zgierska A, Grettie J, Lyftogt J, Fortney L.

Abstract

OBJECTIVE:

To assess the relation between knee osteoarthritis (KOA)-specific quality of life (QOL) and intra-articular cartilage volume (CV) in participants treated with prolotherapy. KOA is characterized by CV loss and multifactorial pain. Prolotherapy is an injection therapy reported to improve KOA-related QOL to a greater extent than blinded saline injections and at-home exercise, but its mechanism of action is unclear.

DESIGN:

Two-arm (prolotherapy, control), partially blinded, controlled trial.

SETTING:

Outpatient.

PARTICIPANTS:

Adults with ≥ 3 months of symptomatic KOA (N=37).

INTERVENTIONS:

Prolotherapy: 5 monthly injection sessions; Control: blinded saline injections or at-home exercise.

MAIN OUTCOME MEASURES:

Primary: KOA-specific QOL scores (baseline, 5, 9, 12, 26, and 52wk; Western Ontario and McMaster University Osteoarthritis Index). Secondary: KOA-specific pain, stiffness, function (Western Ontario McMaster University Osteoarthritis Index subscales), and magnetic resonance imaging-assessed CV (baseline, 52wk).

RESULTS:

Knee-specific QOL improvement among prolotherapy participants exceeded that among controls (17.6 ± 3.2 points vs 8.6 ± 5.0 points; $P=.05$) at 52 weeks. Both groups lost CV over time ($P<.05$); no between-group differences were noted ($P=.98$). While prolotherapy participants lost CV at varying rates, those who lost the least CV ("stable CV") had the greatest improvement in pain scores. Among prolotherapy participants, but not control participants, the change in CV and the change in pain (but not stiffness or function) scores were correlated; each 1% CV loss was associated with 2.7% less improvement in pain score ($P<.05$).

CONCLUSIONS:

Prolotherapy resulted in safe, substantial improvement in KOA-specific QOL compared with control over 52 weeks. Among prolotherapy participants, but not controls, magnetic resonance imaging-assessed CV change (CV stability) predicted pain severity score change, suggesting that prolotherapy may have a pain-specific disease-modifying effect. Further research is warranted.

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rights reserved. PMID: 23850615

Exercise and progression of degeneration

Arthritis Res Ther. 2014 Jan 29;16(1):R32.

Increased physical activity severely induces osteoarthritic changes in knee joints with papain induced sulphate-glycosaminoglycan depleted cartilage.

Siebelt M, Groen HC, Koelewijn SJ, de Blois E, Sandker M, Waarsing JH, Müller C, van Osch GJ, de Jong M, Weinans H.

Abstract

INTRODUCTION:

Articular cartilage needs sulphated-glycosaminoglycans (sGAG) to withstand high pressures while mechanically loaded. Chondrocyte sGAG synthesis is regulated by exposure to compressive forces. Moderate physical exercise is known to improve cartilage sGAG content and might protect against osteoarthritis (OA). This study investigated whether rat knee joints with sGAG depleted articular through papain injections might benefit from moderate exercise, or whether this increases the susceptibility for cartilage degeneration.

METHODS:

sGAG were depleted from cartilage through intra-articular papain injections in the left knee joints of 40 Wistar rats, their contralateral joints served as healthy controls. Of the 40 rats included in the study, 20 rats remained sedentary and the other 20 were subjected to a moderately intense running protocol. Animals were longitudinally monitored for 12 weeks with in vivo micro computed tomography (muCT) to measure subchondral bone changes and single-photon emission computed tomography (SPECT)/CT to determine synovial macrophage activation. Articular cartilage was analyzed at 6 and 12 weeks with ex vivo contrast enhanced muCT and histology to measure sGAG content and cartilage thickness.

RESULTS:

All outcome measures were unaffected by moderate exercise in healthy control joints of running animals compared to healthy control joints of sedentary animals. Papain injections in sedentary animals resulted in severe sGAG depleted cartilage, slight loss of subchondral cortical bone, increased macrophage activation and osteophyte formation. In running animals, papain induced sGAG depleted cartilage showed increased cartilage matrix degradation, sclerotic bone formation, increased macrophage activation and more osteophyte formation.

CONCLUSIONS:

Moderate exercise enhanced OA progression in papain injected joints and did not protect against development of the disease. This was not restricted to more extensive cartilage damage, but also resulted in pronounced subchondral sclerosis, synovial macrophage activation and osteophyte formation.

FOOT AND ANKLE

Mental health and foot pain

Arthritis Care Res (Hoboken). 2014 Jan 27. doi: 10.1002/acr.22292.

The relationship between mental health and foot pain.

Butterworth PA, Urquhart DM, Cicuttini FM, Menz HB, Strauss BJ, Proietto J, Dixon JB, Jones G, Wluka AE.

Abstract

OBJECTIVE:

Although mental health is related to the persistence of musculoskeletal pain, our understanding of the relationship between mental health and foot pain is limited. Subsequently, we conducted a three year longitudinal study to examine the relationship between mental health and foot pain in a community based population.

METHODS:

Eighty-three community dwelling participants (mean body mass index $35.3 \text{ kg/m}^2 \pm 9.0$) who had foot pain at study inception in 2008, and for whom measures of mental health (Mental Component Summary of the Short Form-36) were available, were invited to take part in this follow-up study in 2011. Change in foot pain was determined by the difference between the Manchester Foot Pain and Disability Index score at baseline and follow up; therefore, a decrease in the score indicates improved foot pain and an increase indicates deterioration in foot pain. Linear regression was used to determine the factors affecting change in foot pain.

RESULTS:

Of the 62 respondents (75% response rate, 49 females and 13 males), there were 27 (44%) whose foot pain deteriorated. A higher Mental Component Summary score of the Short Form-36 at baseline was associated with a slower progression of foot pain (beta coefficient -0.29 , 95% confidence interval -0.42 to -0.01); adjusted for age, sex, body mass index and physical health.

CONCLUSION:

Mental health is associated with changes in foot pain. Clinicians dealing with this population should consider the contribution of mental health in their management and treatment of foot pain.
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Orthotics/shoes

High heel shoes

Effects of High-Heeled Shoes and Asymmetrical Load Carrying on Lower-Extremity Kinematics During Walking in Young Women

Soul Lee, MSc* and Jing Xian Li, PhD*

Journal of the American Podiatric Medical Association, 02/07/2014 Evidence Based Medicine+

Author Affiliations *School of Human Kinetics, University of Ottawa, Ottawa, Ontario, Canada.

Background: Asymmetrical load carrying and wearing high-heeled shoes are very common. Biomechanics studies on the combined effects of high-heeled shoe wearing and asymmetrical load carrying are lacking. We sought to identify changes in lower-extremity joint kinematics associated with the effect of shoes and asymmetrical load carrying during walking.

Methods: Fifteen healthy young women (mean \pm SD: age, 24.67 ± 3.54 years; body weight, 54.96 ± 6.67 kg; and height, 162.2 ± 3.91 cm) who habitually wore high-heeled shoes participated in the study. They were asked to walk under nine combined conditions of three heights of shoe heels (0, 3, and 9 cm) and three carried loads (0%, 5%, and 10% of body weight). Temporospatial parameters and maximal joint angles in the sagittal and frontal planes of the hip, knee, and ankle on both limbs were studied.

Results: It was found that high-heeled shoe wearing and asymmetrical load carrying altered temporospatial parameters and joint kinematics. With increased heel height and load weight, cadence decreased and stride length increased. The knee flexion angle increased with an increase in heel height, and the load served only to exacerbate the changes. Changes in the hip angle were mostly caused by asymmetrical load carrying, whereas angle changes in the ankle were mostly caused by an increase in heel height.

Conclusions: This study demonstrated that when high-heeled shoe wearing and asymmetrical load carrying are combined, changes at each joint are much greater than with high-heeled shoe wearing or load carrying alone.

(J Am Podiatr Med Assoc 104(1): 58–65, 2014)

ANKLE/INSTABILITY

Tapping

Clin J Sport Med. 2014 Jan;24(1):51-7. doi: 10.1097/JSM.0b013e31829ddc74.

Residual mechanical effectiveness of external ankle tape before and after competitive professional soccer performance.

Best R, Mauch F, Böhle C, Huth J, Brüggemann P.

Abstract

OBJECTIVE:

To evaluate the presupposed preventive residual mechanical effectiveness of the widespread use of adhesive elastic ankle tape after a nonlaboratory, realistic soccer-specific outfield intervention reflecting a soccer halftime.

DESIGN:

A prospective nonrandomized test-retest design was used.

SETTING:

Laboratory.

PARTICIPANTS:

Seventeen professional male outfield players (mean age, 25.5) without any signs of chronic ankle instability.

INTERVENTION:

Participants were investigated before and after a 45-minute soccer-specific field intervention.

MAIN OUTCOME MEASURES:

The passive inversion range of motion (ROM) of the ankle was tested unloaded on a self-developed inversion device with and without a standardized ankle tape before and after the intervention. Additionally, electromyography signal was taken to assure the inactivity of the protective evertor muscles, and reliability tests for the inversion device (test-retest and trial to trial) were conducted in 12 healthy controls.

RESULTS:

Tape restricted the maximum passive inversion ROM of the uninjured ankle significantly to 50.3%. The protection declined nearly completely after 45 minutes of outfield soccer performance to a negligible nonsignificant ROM restriction of 9.7%. Pearson correlation coefficient for the reliability was 0.931 ($P \leq 0.001$) for the test-retest and 0.983 ($P \leq 0.001$) for the trial-to-trial test.

CONCLUSIONS:

The initial significant protection of external ankle-tape support declines almost completely without relevant remaining residual mechanical effect after 45 minutes, reflecting a soccer halftime. The so far presupposed residual mechanical effectiveness of tape to prevent injury is increasingly irrelevant during soccer performance and consequently antidromic to the increasing injury risk toward the end of a soccer halftime.

PMID: 24080786

Achilles Tendon

Calf strength

Exp Gerontol. 2014 Jan 23. pii: S0531-5565(14)00023-0. doi: 10.1016/j.exger.2014.01.011.

The effect of knee joint angle on plantar flexor power in young and old men.

Dalton BH1, Allen MD2, Power GA3, Vandervoort AA4, Rice CL5.

Abstract

Human adult aging is associated with a loss of strength, contractile velocity and hence, power. The principal plantar flexors, consisting of the bi-articular gastrocnemii and the mono-articular soleus, appear to be affected differently by the aging process. However, the age-related effect of knee joint angle on the torque-angular velocity relationship and power production of this functionally important muscle group is unknown.

The purpose was to determine whether flexing the knee, thereby reducing the gastrocnemius contribution to plantar flexion, would exacerbate the age-related decrements in plantar flexion power, or shift the torque-angular velocity relationship differently in older compared with young men. Neuromuscular properties were recorded from 10 young (~25y) and 10 old (~78y) men with the knee extended (170°) and flexed (90°), in a randomized order. Participants performed maximal voluntary isometric contractions (MVCs), followed by maximal velocity-dependent shortening contractions at pre-set loads, ranging from 15 to 75% MVC. The young men were ~20-25% stronger, ~12% faster and ~30% more powerful than the old for both knee angles ($P < 0.05$). In both age groups, isometric MVC torque was ~17% greater in the extended than flexed knee position, with no differences in voluntary activation (>95%). The young men produced 7-12% faster angular velocities in the extended knee position for loads $\leq 30\%$ MVC, but no differences at higher loads; whereas there were no detectable differences in angular velocity between knee positions in the old across all relative loads. For both knee angles, young men produced peak power at $43.3 \pm 9.0\%$ MVC, whereas the old men produced peak power at $54.8 \pm 7.9\%$ MVC.

These data indicate that the young, who have faster contracting muscles compared with the old, can rely more on velocity than torque for generating maximal optimal power.

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KEYWORDS: Aging, Force-velocity, Muscle, Strength, Triceps surae PMID: 24462806

Plantar surface

Injections/Prolo/plasma rich

PM R. 2014 Feb;6(2):152-8. doi: 10.1016/j.pmrj.2013.07.003. Epub 2013 Jul 19.

Autologous platelet-rich plasma versus dextrose prolotherapy for the treatment of chronic recalcitrant plantar fasciitis.

Kim E1, Lee JH2.

Abstract

OBJECTIVE:

To determine the efficacy of autologous platelet-rich plasma (PRP) compared with dextrose prolotherapy (DP) in patients with chronic recalcitrant plantar fasciitis (PF) DESIGN: A single-blinded, randomized, controlled study.

SETTING:

Department of Physical Medicine and Rehabilitation of a university hospital.

PARTICIPANTS:

Twenty-one patients with a clinical diagnosis of chronic PF confirmed by diagnostic ultrasound (plantar fascia thickness >4 mm) were randomly assigned to the PRP group (n = 10) or the DP group (n = 11).

INTERVENTIONS:

Each patient received 2 injections into the plantar fascia through a peppering technique under ultrasound guidance at an interval of 2 weeks, either with 2 mL of autologous PRP or 2 mL of 15% dextrose/lidocaine solution.

MAIN OUTCOME MEASUREMENTS:

The outcome measures included the pain, disability, and activity limitation subscales, measured by means of the Foot Functional Index. Data were collected before the first injection, at 2 weeks (before the second injection), and at the 2- and 6-month follow-ups.

RESULTS:

All patients completed the follow-ups, with the exception of 1 patient in the PRP group. The mean Foot Functional Index total and subcategory score improvements were greater in the PRP group compared with the DP group (improvement with PRP vs DP, total: 30.4% vs 15.1%, pain: 29.7% vs 17.1%, disability: 26.6% vs 14.5%, activity limitation: 28.0% vs 12.4%). However, no statistically significant difference was noted at any follow-up. In the pain and disability subcategories, both groups showed significant improvements at the last re-evaluation. The PRP group also showed significant improvements in the disability and activity limitation subscales at the second re-evaluation.

CONCLUSIONS:

Each treatment seems to be effective for chronic recalcitrant PF, expanding the treatment options for patients in whom conservative care has failed. PRP treatment also may lead to a better initial improvement in function compared with DP treatment.

Copyright © 2014 American Academy of Physical Medicine and Rehabilitation. Published by Elsevier Inc. All rights reserved. PMID: 23876935

Plantar fascia and aging

Gender-related effect of aging on the sonographic appearance of plantar fascia □

Journal of Musculoskeletal Pain , 02/25/2014 Clinical Article ► [Access PubMed and Publisher](#)

Cheng JW, et al.

Abstract:

Objectives: To investigate the association between demographic variables [especially age] and the sonographic appearance of the plantar fascia [PF].

Methods: Twenty-six healthy volunteers [52 feet, age 24–79 years] without inferior heel pain were recruited. The thickness of the PF of the participants was measured in sonographic examination. The mean grey level in the region of interest in the sonogram of each PF was calculated using image processing software. Pearson's correlation and stepwise regression analyses were performed between demographic variables and sonographic measures.

Results: The mean thickness of the PF was 0.319 ± 0.059 cm for men and 0.309 ± 0.093 cm for women. Stepwise regression analysis showed that age is an independent predictor of the thickness of the PF, and age and gender are independent predictors of echogenicity of the PF. Pearson's correlation analysis showed significant positive correlations between age and thickness of the PF [$r = 0.538$] and between gender [male/female = 0/1] and echogenicity of the PF [$r = 0.437$]. A negative correlation between age and echogenicity of the PF [$r = -0.344$] was also shown. We divided the subjects into two gender-based groups and found significant correlations between age and sonographic measures only in the female group.

Conclusions: The thickness of the PF increases and the echogenicity of the PF decreases with age. Although the echogenicity of the PF is higher in women than in men, the PF of women shows a greater association with aging

MANUAL THERAPY

Manual Therapy impact on pain pill taking

J Am Osteopath Assoc. 2014 Feb;114(2):90-8. doi: 10.7556/jaoa.2014.022.

OMT Associated With Reduced Analgesic Prescribing and Fewer Missed Work Days in Patients With Low Back Pain: An Observational Study.

Prinsen JK, Hensel KL, Snow RJ.

Abstract

CONTEXT: Randomized controlled trials (RCTs) are considered the standard for establishing practice guidelines; however, they are expensive and time-consuming, and often the generalizability of the results is limited.

OBJECTIVES: To conduct an observational study using the findings of the American Osteopathic Association's Clinical Assessment Program (AOA-CAP) low back pain module, and to compare these findings with those of a major back pain-related RCT to determine the validity and generalizability of this pseudoexperimental model.

METHODS:

Data were abstracted from the AOA-CAP for Residencies platform from April 1, 2006, through October 5, 2007, with a diagnosis code consistent with low back pain. Process and outcome measures were compared after segregating a similar patient population to an RCT that compared "osteopathic spinal manipulation" with standard care.

RESULTS:

A total of 1013 medical records were abstracted and entered into the AOA-CAP low back pain module. Mean (standard deviation [SD]) age was 44.7 (15.9) years, and body mass index was 29.6 (8.1). The eligible patients comprised 415 men (41.0%) and 598 women (59.0%), and common comorbid disease was found in 69 patients (6.8%). Activities of daily living were limited in 402 patients (42.4%), whereas 546 (57.6%) had no limitations. Previous exacerbations of low back pain occurred in 653 patients (65.9%). Most patients had no sensory or proprioception deficit (729 [87.7%]), and motor function was normal in 636 patients (74.5%). Normal ankle and knee reflexes were found in 744 of 814 (91.4%) and 755 of 829 (89.0%) patients, respectively. Osteopathic manipulative treatment (OMT) was performed on the lumbar spine (576 patients [56.9%]), thoracic spine (411 [40.6%]), sacrum/pelvis (440 [43.4%]), rib (261 [25.8%]), and lower extremity (256 [25.3%]). A segregated patient cohort (n=539) showed statistically significant differences between patients who received OMT and those who did not with the use of analgesics, steroids, spinal injections, straight-leg raising, and days off or limited work duties.

CONCLUSION:

The observational findings of the present study, which suggest that analgesic medication use is lower in patients who receive OMT, align with previous findings of RCTs and support the generalizability of these findings.

Nerve Palpation

J Manipulative Physiol Ther. 2014 Feb;37(2):97-104. doi: 10.1016/j.jmpt.2013.12.006. Epub 2014 Jan 3.

Intraexaminer and interexaminer reliability of manual palpation and pressure algometry of the lower limb nerves in asymptomatic subjects.

Fingleton CP1, Dempsey L2, Smart K3, Doody CM4.

Abstract

OBJECTIVE:

Nerve palpation is a method of clinically identifying mechanosensitivity of neural tissue by means of pressure algometry and manual palpation. There are few investigations of the reliability of lower limb nerve palpation, and femoral nerve palpation has never been previously reported. The aim of this study was to investigate the reliability of nerve palpation of the femoral, sciatic, tibial, and common peroneal nerves and to report normative values for the femoral nerve.

METHODS:

The 4 lower limb nerves were palpated in 39 healthy volunteers using pressure algometry and manual digital palpation. Measurements were taken twice by 1 rater (intrarater reliability) and once by a second rater (interrater reliability).

RESULTS:

Intraclass correlation coefficients for pressure pain thresholds (PPTs) via pressure algometry of the femoral, common peroneal, tibial, and sciatic nerves were 0.69, 0.84, 0.64, and 0.9 for intrarater reliability, respectively, and 0.82, 0.7, 0.56, and 0.75 for interrater reliability. κ Values for manual palpation were 0.59, 0.55, 0.42, and 0.60 for intrarater reliability and 0.30, 0.49, 0.37, and 0.60 for interrater reliability. Males demonstrated significantly higher PPTs than females for the femoral, sciatic, and tibial nerves, and differences in PPTs were present between right and left sides.

CONCLUSION:

Nerve palpation of the femoral, common peroneal, and sciatic nerves using pressure algometry demonstrated good to excellent reliability, whereas the tibial nerve PPTs showed moderate to good reliability. Manual palpation measurements demonstrated fair to moderate reliability.

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KEYWORDS: Musculoskeletal Pain, Peripheral Nerves, Reliability and Validity PMID: 24387890

Provocation tests

J Manipulative Physiol Ther. 2014 Feb;37(2):105-15. doi: 10.1016/j.jmpt.2013.09.006. Epub 2014 Jan 6.

Intertester agreement and validity of identifying lumbar pain provocative movement patterns using active and passive accessory movement tests.

Hidalgo B1, Hall T2, Nielens H3, Detrembleur C3.

OBJECTIVE:

The purpose of this study was to evaluate the interexaminer agreement and validity of active and passive pain provocation tests in the lumbar spine.

METHODS:

Two blinded raters examined 36 participants, 18 of whom were asymptomatic and 18 reported subacute nonspecific low back pain (LBP). Two types of pain provocation tests were performed: (1) physiological movements in single (flexion/extension) and, when necessary, combined planes and (2) passive accessory intervertebral movement tests of each lumbar vertebra in prone with the lumbar spine in neutral, flexion, and extension position.

RESULTS:

The interobserver agreement in both groups was good to excellent for the identification of flexion ($\kappa = 0.87-1$) or extension ($\kappa = 0.65-0.74$) as the most painful pattern of spinal movement. In healthy participants, 0% was identified as having a flexion provocative pattern and 8.8% were identified as having an extension provocative pattern. In the LBP group, 20% were identified as having a flexion provocative pattern vs 60% with an extension provocative pattern. The average interexaminer agreement for passive accessory intervertebral movement tests in both groups was moderate to excellent ($\kappa = 0.42-0.83$). The examiners showed good sensitivity (0.67-0.87) and specificity (0.82-0.85) to distinguish participants with LBP using this combined examination procedure.

CONCLUSION:

The use of a combination of pain provocative tests was found to have acceptable interexaminer reliability and good validity in identifying the main pain provocative movement pattern and the lumbar segmental level of involvement. These pain provocation tests were able to distinguish participants with LBP from asymptomatic participants and may help clinicians in directing manual therapy treatment.

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KEYWORDS: Diagnosis, Low Back Pain, Musculoskeletal Manipulations, Musculoskeletal Pain, Physical Examination, Reproducibility of Results PMID: 24401656

Manual therapist collaboration with neuro therapist

Manual Therapy. Available online 25 January 2014, In Press, Corrected Proof — Note to users
Professional issue

Recognising neuroplasticity in musculoskeletal rehabilitation: A basis for greater collaboration between musculoskeletal and neurological physiotherapists

Suzanne J. Snodgrass, Nicola R. Heneghanb, Henry Tsaoc, Peter T. Stanwelld, Darren A. Rivetta, Paulette M. Van Vlieta

Abstract

Evidence is emerging for central nervous system (CNS) changes in the presence of musculoskeletal dysfunction and pain. Motor control exercises, and potentially manual therapy, can induce changes in the CNS, yet the focus in musculoskeletal physiotherapy practice is conventionally on movement impairments with less consideration of intervention-induced neuroplastic changes. Studies in healthy individuals and those with neurological dysfunction provide examples of strategies that may also be used to enhance neuroplasticity during the rehabilitation of individuals with musculoskeletal dysfunction, improving the effectiveness of interventions. In this paper, the evidence for neuroplastic changes in patients with musculoskeletal conditions is discussed. The authors compare and contrast neurological and musculoskeletal physiotherapy clinical paradigms in the context of the motor learning principles of experience-dependent plasticity: part and whole practice, repetition, task-specificity and feedback that induces an external focus of attention in the learner. It is proposed that increased collaboration between neurological and musculoskeletal physiotherapists and researchers will facilitate new discoveries on the neurophysiological mechanisms underpinning sensorimotor changes in patients with musculoskeletal dysfunction. This may lead to greater integration of strategies to enhance neuroplasticity in patients treated in musculoskeletal physiotherapy practice.

Keywords: Neuroplasticity; Rehabilitation; Motor learning

T spine

A randomized clinical trial to compare the immediate effects of seated thoracic manipulation and targeted supine thoracic manipulation on cervical spine flexion range of motion and pain 

JMMT 2011

Karas1 Steve¹; Olson Hunt2 Megan J.²

Author Affiliations

Abstract

Design: Randomized clinical trial.

Objectives: To determine the effectiveness of seated thoracic manipulation versus targeted supine thoracic manipulation on cervical spine pain and flexion range of motion (ROM). There is evidence that thoracic spine manipulation is an effective treatment for patients with cervical spine pain. This evidence includes a variety of techniques to manipulate the thoracic spine. Although each of them is effective, no research has compared techniques to determine which produces the best outcomes.

Methods: A total of 39 patients with cervical spine pain were randomly assigned to either a seated thoracic manipulation or targeted supine thoracic manipulation group. Pain and flexion ROM measures were taken before and after the intervention.

Results: Pain reduction (post-treatment–pre-treatment) was significantly greater in those patients receiving the targeted supine thoracic manipulation compared to the seated thoracic manipulation ($P < 0.05$). Although not significant, we did observe greater improvement in flexion ROM in the targeted supine thoracic manipulation group. The results of this study indicate that a targeted supine thoracic manipulation may be more effective in reducing cervical spine pain and improving cervical flexion ROM than a seated thoracic manipulation. Future studies should include a variety of patients and physical therapists (PTs) to validate our findings.

Keywords: Thoracic spine, Orthopedic manipulative therapy, Cervical spine pain, Thoracic spine manipulation

STM

Trigger points

[Curr Rheumatol Rep.](#) 2014 Jan;16(1):395. doi: 10.1007/s11926-013-0395-2.

Myofascial trigger points: peripheral or central phenomenon?

[Fernández-de-las-Peñas C, Dommerholt J.](#)

Abstract

Trigger points (TrP) are hyperirritable spots in a taut band of a skeletal muscle, which usually have referred pain. There is controversy over whether TrP are a peripheral or central nervous system phenomenon. Referred pain, the most characteristic sign of TrP, is a central phenomenon initiated and activated by peripheral sensitization, whereby the peripheral nociceptive input from the muscle can sensitize dorsal horn neurons that were previously silent. TrP are a peripheral source of nociception, and act as ongoing nociceptive stimuli contributing to pain propagation and widespread pain. Several studies support the hypothesis that TrP can induce central sensitization, and appropriate TrP treatment reduces central sensitization. In contrast, preliminary evidence suggests that central sensitization can also promote TrP activity, although further studies are needed. Proper TrP management may prevent and reverse the development of pain propagation in chronic pain conditions, because inactivation of TrP attenuates central sensitization.

PMID: 24264721 [PubMed - in process]

Massage

Efficacy of massage therapy on pain and dysfunction in patients with neck pain: A systematic review and meta-analysis *Full Text* □

Evidence-based Complementary and Alternative Medicine , 02/25/2014 Evidence Based Medicine Review Article
Cheng YH, et al.

Abstract

Objective. To systematically evaluate the evidence of whether massage therapy (MT) is effective for neck pain.

Methods. Randomized controlled trials (RCTs) were identified through searches of 5 English and Chinese databases (to December 2012). The search terms included neck pain, neck disorders, cervical vertebrae, massage, manual therapy, Tuina, and random. In addition, we performed hand searches at the library of Nanjing University of Traditional Chinese Medicine. Two reviewers independently abstracted data and assessed the methodological quality of RCTs by PEDro scale. And the meta-analyses of improvements on pain and neck-related function were conducted.

Results. Fifteen RCTs met inclusion criteria. The meta-analysis showed that MT experienced better immediate effects on pain relief compared with inactive therapies (; standardised mean difference (SMD), 1.30; 95% confidence interval (CI), 0.09 to 2.50;) and traditional Chinese medicine (; SMD, 0.73; 95% CI 0.13 to 1.33;). There was no valid evidence of MT on improving dysfunction. With regard to follow-up effects, there was not enough evidence of MT for neck pain.

Conclusions. This systematic review found moderate evidence of MT on improving pain in patients with neck pain compared with inactive therapies and limited evidence compared with traditional Chinese medicine. There were no valid lines of evidence of MT on improving dysfunction. High quality RCTs are urgently needed to confirm these results and continue to compare MT with other active therapies for neck pain

Muscles

Loss with inactivity

Acta Physiol (Oxf). 2013 Oct 30. doi: 10.1111/apha.12190. [Epub ahead of print]

Substantial skeletal muscle loss occurs during only 5 days of disuse.

Wall BT, Dirks ML, Snijders T, Senden JM, Dolmans J, van Loon LJ.

Author information

Abstract

AIM:

The impact of disuse on the loss of skeletal muscle mass and strength has been well documented. Given that most studies have investigated muscle atrophy after more than 2 weeks of disuse, few data are available on the impact of shorter periods of disuse. We assessed the impact of 5 and 14 days of disuse on skeletal muscle mass, strength and associated intramuscular molecular signalling responses.

METHODS:

Twenty-four healthy, young (23 ± 1 year) males were subjected to either 5 ($n = 12$) or 14 ($n = 12$) days of one-legged knee immobilization using a full leg cast. Before and immediately after the immobilization period, quadriceps muscle cross-sectional area (CSA), leg lean mass and muscle strength were assessed, and biopsies were collected from the vastus lateralis.

RESULTS:

Quadriceps muscle CSA declined from baseline by 3.5 ± 0.5 ($P < 0.0001$) and $8.4 \pm 2.8\%$ ($P < 0.001$), leg lean mass was reduced by 1.4 ± 0.7 ($P = 0.07$) and $3.1 \pm 0.7\%$ ($P < 0.01$) and strength was decreased by 9.0 ± 2.3 ($P < 0.0001$) and $22.9 \pm 2.6\%$ ($P < 0.001$) following 5 and 14 days of immobilization respectively. Muscle myostatin mRNA expression doubled following immobilization ($P < 0.05$) in both groups, while the myostatin precursor isoform protein content decreased after 14 days only ($P < 0.05$). Muscle MAFBx mRNA expression increased from baseline by a similar magnitude following either 5 or 14 days of disuse, whereas MuRF1 mRNA expression had increased significantly only after 5 days.

CONCLUSION:

We conclude that even short periods of muscle disuse can cause substantial loss of skeletal muscle mass and strength and are accompanied by an early catabolic molecular signalling response.

BET

Tactile limitations

BMC Musculoskelet Disord. 2014 Feb 26;15(1):59.

Tactile acuity training for patients with chronic low back pain: a pilot randomised controlled trial.

Ryan C, Harland N, Drew BT, Martin D.

Abstract

BACKGROUND:

Chronic pain can disrupt the cortical representation of a painful body part. This disruption may play a role in maintaining the individual's pain. Tactile acuity training has been used to normalise cortical representation and reduce pain in certain pain conditions. However, there is little evidence for the effectiveness of this intervention for chronic low back pain (CLBP). The primary aim of this study was to inform the development of a fully powered randomised controlled trial (RCT) by providing preliminary data on the effect of tactile acuity training on pain and function in individuals with CLBP. The secondary aim was to obtain qualitative feedback about the intervention.

METHODS:

In this mixed-methods pilot RCT 15 individuals were randomised to either an intervention (tactile acuity training) or a placebo group (sham tactile acuity training). All participants received 3 sessions of acuity training (intervention or sham) from a physiotherapist and were requested to undertake daily acuity home training facilitated by an informal carer (friend/relative). All participants also received usual care physiotherapy. The primary outcome measures were pain (0-100visual analogue scale (VAS)) and function (Roland Morris Disability Questionnaire (RMDQ)). Participants and their informal carers were invited to a focus group to provide feedback on the intervention.

RESULTS:

The placebo group improved by the greatest magnitude for both outcome measures, but there was no statistically significant difference (Mean difference (95%CI), p-value) between groups for change in pain (25.6 (-0.7 to 51.9), p = 0.056) or function (2.2 (-1.6 to 6.0), p = 0.237). Comparing the number of individuals achieving a minimally clinically significant improvement, the placebo group had better outcomes for pain with all participants achieving $\geq 30\%$ improvement compared to only a third of the intervention group (6/6 vs. 3/9, p = 0.036). Qualitatively, participants reported that needing an informal carer was a considerable barrier to the home training component of the study.

CONCLUSIONS:

This pilot RCT found tactile acuity training to be no more effective than sham tactile acuity training for function and less effective for pain in individuals with CLBP. That the intervention could not be self-applied was a considerable barrier to its use. Trial registration: ISRCTN: ISRCTN98118082. PMID: 24571855

Back packs/LBP/Perception

Eur Spine J. 2014 Feb 7.

No kidding: low back pain and type of container influence adolescents' perception of load heaviness.

Nicolet T, Mannion AF, Heini P, Cedraschi C, Balagué F.

Abstract

PURPOSE:

The relationship between low back pain (LBP) and the lifting/carrying of loads is still a matter of great discussion. In teenagers, the weight of the school bag has been considered to play a pathogenic role in LBP but the relationship between the actual weight of the school bag and LBP symptoms does not seem to be a straightforward one. Numerous factors have been identified that influence the perception of weight. This study aimed to evaluate the influence of low back pain and the type of container on the perception of load heaviness by healthy teenagers.

METHODS:

A convenience sample of 80 healthy teenage males (mean \pm SD age 13.9 ± 2.1 years) was recruited from the members of two local sports clubs. The volunteers were evaluated during one of their training sessions. Information about a history of consequential LBP was gathered by questionnaire. Subjects were invited to estimate the weight of three bags (a typical school bag, a sports bag with the logo of a well-known brand, and a neutral bag) containing two different loads (total weights approximately 3 and 5 kg).

RESULTS:

Consequential LBP (i.e., LBP requiring medical attention and/or interfering with usual sports activities) was reported by 26.2 % of them. The majority of the LBP episodes occurred ≥ 3 months before the tests. Overall, teenagers significantly ($p \leq 0.05$) underestimated the weight of the sports bag compared with the school bag and the neutral bag. Compared with those with no LBP, subjects with a history of LBP overestimated the weight of the heavier load.

CONCLUSIONS:

Our results suggest that several subjective variables significantly influence the perception of load heaviness. Until we have a better understanding of the mechanical role of the backpack weight versus the perception of its weight in the aetiology of LBP, any recommendations about the schoolbag weight limit should be viewed with caution.

PMID: 24504788

Exercise

Plyometrics

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.

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

Exercise and LBP

Eur J Phys Rehabil Med. 2014 Jan 16.

Predictors of response to exercise therapy for chronic low back pain: result of a prospective study with one year follow-up.

Cecchi F, Pasquini G, Paperini A, Boni R, Castagnoli C, Pistrutto S, Macchi C.

Abstract

BACKGROUND: Low back pain (LBP) management is a critical public health issue in all developed countries. Most approaches show evidence of effects only in the short term.

AIM: To identify predictors of functional outcome on discharge and at 1 year.

DESIGN: Prospective cohort study.

SETTING: Outpatient rehabilitation department.

POPULATION: Patients aged >18 addressed to exercise therapy for persisting LBP.

METHODS: The individually designed physiotherapy program provided 7 sessions (45'); patients were given advice to stay active and continue exercise program on discharge. Baseline (T0) assessment included: age, sex, time since onset, pain-related drug use, previous treatments, job, physical activity, pain (NRS) and Mental Health (SF36 sub-score); at follow-up (T2), we also enquired to on adherence to exercise prescription, physical activity, drugs. The primary outcome measure was the Roland and Morris Disability Questionnaire (RMDQ) patients scoring improvement >30% (minimal clinical important difference) were classified as respondent.

RESULTS: 211 completed follow-up (70% women; age 70.4±11.9). Average RMDQ score was reduced by 35% at T1 and by 31% at T2; NRS by 28% (T1) and 24% (T2); 125 patients (59%) were responders on discharge; 106 (50%) at follow-up. Only higher baseline NRS predicted poor response to treatment at T1 (OR=0.83, 95% CI: 0.71-0.95, P=0.012). At T2, older age (OR=0.94, 95% CI: 0.91-0.98, P=0.003), drug use (OR=0.18, 95% CI: 0.08-4.69, P<0.001) and previous treatments (OR 0.33, 95% CI: 0.15 to 0.71, P=0.004) were significantly associated with poor response, while, baseline mental health (OR=1.1, 95% CI: 1.01-1.24, P=0.02) and adherence to exercises for LBP (OR=2.10, 95% CI: 1.03-4.42, P=0.04) predicted improved outcome.

CONCLUSIONS: The individually designed exercise therapy program for chronic LBP was associated to clinically significant functional improvement both on discharge and at 1 year. Only severe pain intensity predicted poor treatment response on discharge. At one year, younger age and better mental health predicted improved outcome, while use of drugs and previous LBP treatments were associated with worse response. Adherence to the exercise program almost doubled the probability of a favorable outcome.

CLINICAL REHABILITATION IMPACT: Adherence to an extensive individually designed exercise therapy program improves long term functional outcome of chronic low back pain.

Core

J Bodyw Mov Ther. 2013 Oct;17(4):541-59. doi: 10.1016/j.jbmt.2013.03.012. Epub 2013 Jun 28.

'The core': understanding it, and retraining its dysfunction.

Key J.

Abstract

"Core stability training" is popular in both the therapeutic and fitness industries but what is actually meant and understood by this concept? And does everyone need the same training approach? This paper examines the landscape of 'the core' and its control from both a clinical and research perspective. It attempts a comprehensive review of its healthy functional role and how this is commonly changed in people with spinal and pelvic girdle pain syndromes. The common clinically observable and palpable patterns of functional and structural change associated with 'problems with the core' have been relatively little described. This paper endeavors to do so, introducing a variant paradigm aimed at promoting the understanding and management of these altered patterns of 'core control'. Clinically, two basic subgroups emerge. In light of these, the predictable difficulties that each group finds in establishing the important fundamental elements of spino-pelvic 'core control' and how to best retrain these, are highlighted. The integrated model presented is applicable for practitioners re-educating movement in physiotherapy, rehabilitation, Pilates, Yoga or injury prevention within the fitness industry in general.

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KEYWORDS: Back pain, Core strength, Injury prevention, Pilates, Yoga

Comment in Contextualising the core. [J Bodyw Mov Ther. 2013] PMID: 24139017

Exercise prevention

Eur Spine J. 2014 Feb 4.

A prospective, cluster-randomized controlled trial of exercise program to prevent low back pain in office workers.

Sihawong R, Janwantanakul P, Jiamjarasrangsi W.

Abstract

PURPOSE:

The objective of this study was to evaluate the effects of an exercise program focusing on muscle stretching and endurance training on the 12-month incidence of low back pain (LBP) in office workers.

METHODS:

A 12-month prospective cluster-randomized controlled trial was conducted in healthy office workers with lower-than-normal trunk extension flexibility or trunk muscle endurance. Healthy office workers (n = 563) were randomly assigned at the cluster level into either intervention (n = 282) or control (n = 281) groups. Participants in the intervention group received an exercise program that included daily stretching exercise and twice-a-week muscle endurance training. Those in the control group received no intervention. The 12-month incidence of LBP was the primary outcome. Secondary outcome were pain intensity, disability level, and quality of life and health status. Analyses were performed using the Cox proportional hazard models.

RESULTS:

Over the 12-month follow-up, 8.8 % of participants in the intervention group and 19.7 % in the control group developed incidence of LBP. Hazard rate ratios showed a protective effect of the exercise program for LBP (HR = 0.37, 95 % CI 0.22-0.64) after adjusting for biopsychosocial factors. There was no significant difference in pain intensity, disability, and quality of life and health status between those who reported incidence of LBP in the intervention and control groups.

CONCLUSION:

An exercise program consisting of muscle stretching and endurance training is an effective intervention to reduce incident LBP for office workers with lower-than-normal trunk extension flexibility or trunk muscle endurance.

Posture

Sitting posture

Man Ther. 2014 Jan 16. pii: S1356-689X(14)00002-2. doi: 10.1016/j.math.2014.01.001.

Sitting bodily configuration: A study investigating the intra-tester reliability of positioning subjects into a predetermined sitting posture.

Korakakis V1, Sideris V2, Giakas G2.

Abstract

Sitting posture predominates in lifestyle and workplace, but quantitative postural designation is limited due to divergence of methodology used in the studies.

To date, no study has investigated the upper body's habitual or a predetermined sitting posture in healthy individuals assessing together pelvis, spine and head.

The objectives were (i) assessment of intra-rater reliability of positioning subjects to a lordotic sitting posture and (ii) comparison of habitual sitting posture (HSP) with the lordotic posture. Another objective was to synthesize and propose an improved 3D model for pelvis, trunk and head to assess quantitatively the postural sagittal configuration.

A single session test-retest design was employed. After power calculations 25 subjects were recruited. A repeated measure ANOVA revealed significant differences between HSP and the predetermined posture used in the study.

Intra-rater reliability was analysed used the intra-class correlation coefficient (ICC) and also standard error of measurement (SEM) and smallest real difference (SRD) were calculated. The ICC values for all angles ranged from 0.85 to 0.98 indicating almost perfect agreement. The SEMs for all angles ranged in degrees from 0.65 to 1.50 and the SRDs from 1.80 to 4.16. This study provides the most specific sagittal measurement of surface spinal curves, head and pelvis position, in reference to a lordotic seated posture. The clinical significance of this study is reinforced by the fact that postural assessment is conducted by body surface evaluation.

The results regarding reliability and SEMs established that healthy individuals can be reliably positioned in an upright lordotic sitting posture.

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KEYWORDS: Intra-tester reliability, Sagittal angles, Sitting posture, Spinal posture PMID: 24480626

Postural control LBP

European Spine Journal February 2014

Postural control in individuals with and without non-specific chronic low back pain: a preliminary case-control study

Rene Rogieri Caffaro, Fábio Jorge Renovato França, Thomaz Nogueira Burke,
Maurício Oliveira Magalhães, Luiz Armando Vidal Ramos, Amélia Pasqual Marques

Abstract

Study design

A preliminary case-control study.

Objective

To assess postural control in individuals with and without non-specific chronic low back pain (cLBP) during quiet standing.

Summary of background data

cLBP affects 12–33 % of the adult population. Reasons for pain chronicity are yet poorly known. Change in postural control may be a risk factor for cLBP, although available studies are not conclusive.

Methods

Sample consisted of 21 individuals with cLBP and 23 controls without cLBP. Balance was assessed using a force plate (Balance Master®, NeuroCom) by the modified clinical test of sensory interaction and balance, pain severity by the visual analogue scale, quality of life with the SF-36 Questionnaire, and functional disability with the Roland-Morris Questionnaire.

Results

Groups were homogeneous for age, weight, height and body mass index. Relative to controls, participants in the cLBP group had deficits in the postural control, with greater postural sway in the quiet standing condition with closed eyes closed on unstable surfaces ($p < 0.05$) for the following parameters: total COP oscillation [cLBP 1,432.82 (73.27) vs CG 1,187.77 (60.30)], root mean square sagittal plane [cLBP 1.21 (0.06) vs CG 1.04 (0.04)], COP area [cLBP 24.27 (2.47) vs CG 16.45 (1.79)] and mean speed of oscillation [cLBP 12.97 (0.84) vs CG 10.55 (0.70)].

Conclusion

Postural control, as evidenced by increased oscillation of COP, is impaired in individuals with cLBP relative to controls. Differences are magnified by visual deprivation and unstable surface conditions.

TA and primitive reflexes

BMC Musculoskelet Disord. 2014 Feb 22;15(1):52.

Effect of head and limb orientation on trunk muscle activation during abdominal hollowing in chronic low back pain.

Parfrey K, Gibbons SG, Drinkwater EJ, Behm DG.

Abstract

BACKGROUND:

Individuals with chronic low back pain (CLBP) have altered activations patterns of the anterior trunk musculature when performing the abdominal hollowing man[latin small ligature oe]uvre (attempt to pull umbilicus inward and upward towards the spine). There is a subgroup of individuals with CLBP who have high neurocognitive and sensory motor deficits with associated primitive reflexes (PR). The objective of the study was to determine if orienting the head and extremities to positions, which mimic PR patterns would alter anterior trunk musculature activation during the hollowing manoeuvre.

METHODS:

This study compared surface electromyography (EMG) of bilateral rectus abdominis (RA), external oblique (EO), and internal obliques (IO) of 11 individuals with CLBP and evident PR to 9 healthy controls during the hollowing manoeuvre in seven positions of the upper quarter.

RESULTS:

Using magnitude based inferences it was likely (>75%) that controls had a higher ratio of left IO:RA activation with supine (cervical neutral), asymmetrical tonic neck reflex (ATNR) left and right, right cervical rotation and cervical extension positions. A higher ratio of right IO:RA was detected in the cervical neutral and ATNR left position for the control group. The CLBP group were more likely to show higher activation of the left RA in the cervical neutral, ATNR left and right, right cervical rotation and cervical flexion positions as well as in the cervical neutral and cervical flexion position for the right RA.

CONCLUSIONS:

Individuals with CLBP and PR manifested altered activation patterns during the hollowing maneuver compared to healthy controls and that altering cervical and upper extremity position can diminish the group differences. Altered cervical and limb positions can change the activation levels of the IO and EO in both groups.

PMID: 24558971

Scoliosis

Sagittal sitting and standing posture

J Pediatr Orthop. 2013 Aug 20.

Sitting Sagittal Balance is Different From Standing Balance in Children With Scoliosis.

Vaughn JJ, Schwend RM.

Abstract

BACKGROUND::

Several variables can have effect on sagittal balance. The changes that occur between standing and sitting have been inadequately studied, especially in the, pediatric population.

METHODS::

Preoperative sagittal radiographs were obtained in both standing and sitting positions for 26 patients with idiopathic scoliosis before spinal fusion and instrumentation. Standard measurements of thoracic kyphosis, lumbar lordosis, sacral slope (SS), pelvic incidence, pelvic tilt, and lumbar intervertebral angles were, recorded. Differences were compared between positions using 2-sided paired t tests.

RESULTS::

When moving from standing to a seated position, the spine loses 5-degree thoracic kyphosis ($P=0.007$), 29-degree lumbar lordosis ($P<0.0001$), and the sacrum rotates 20 degrees ($P<0.0001$) to a more vertical position. The greatest change in sitting sagittal balance occurs due to increased pelvic tilt with decreased SS. The next greatest change is increased forward flexion of the lowest 2 lumbar vertebrae, 6.5 degrees between L4-L5 ($P<0.0001$) and 5.9 degrees between L5-S1 ($P<0.0001$). Flexion occurs throughout the lumbar spine but its magnitude decreases in the more proximal lumbar segments, 1.6 degrees between L1-L2 ($P=0.028$). The sagittal vertical axis also moves more anterior by 44 mm ($P<0.0001$).

CONCLUSIONS::

Sitting significantly straightens the spine with decreases of thoracic kyphosis, lumbar lordosis, and SS. The majority of the changes occur in the lumbar spine and pelvis. As humans spend much of their time sitting, this difference should be considered when spinal instrumentation is performed. These findings may be important to those who only sit, especially when instrumentation is extended to the pelvis.

LEVEL OF EVIDENCE:: Level II-retrospective prognostic study. PMID: 23965915

ATHLETICS

Impact of Caffeine

Caffeine and performance over consecutive days of simulated competition

□ **Medicine and Science in Sports and Exercise, 02/07/2014 Evidence Based Medicine**
Stadheim HK, et al.

Abstract

Purpose: Performance improvements after caffeine (CAF) ingestion are well documented when using a one day protocol. In numerous competitions such as the Tour de France, Tour de Ski, World Championships and NCAA Championships, athletes compete several days in a row. To date no studies have investigated the effects of CAF when competing consecutive days in a row.

Aim: Investigate the effects of placebo (PLA) and two different CAF doses (3 and 4.5 mg [middle dot] kg⁻¹ body mass) on performance in a 10-min all-out cross-country double poling ergometer test (C-PT) two days in a row.

Method: 8 highly trained male cross-country skiers ($\dot{V}O_{2\max\text{-run}} 78.5 \pm 1.6$ ml [middle dot] kg⁻¹ [middle dot] min⁻¹) participated in the study which was a randomized double-blinded, placebo-controlled, cross-over-design. Performance was assessed as distance covered during a 10-min all-out C-PT. Oral ingestion of CAF or PLA was consumed 75 min before the all-out C-PT.

Results: Poling distance was improved after CAF ingestions compared to PLA both days. The improvements on day one were 4.0% (90% confidence limits: ± 3.3) and 4.0% ± 2.9 for both CAF doses respectively ($P < 0.05$), while improvements on day two were 5.0 ± 3.6 and 5.1% ± 2.8 for CAF3 and CAF4.5 compared to PLA. Improved performance was associated with increased heart rate, adrenaline, blood lactate and $\dot{V}O_2$ consumption after CAF ingestion. Furthermore, performance was elevated despite higher creatine kinase and muscular pain at arrival on day two for both CAF doses.

Conclusion: Both CAF doses improved performance in the 10-min all-out C-PT compared with PLA over two consecutive days. Therefore, CAF seems useful for athletes competing over consecutive days, despite higher muscle damage occurring after enhanced performance the first day.

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Strength training

J Strength Cond Res. 2013 Dec;27(12):3342-51. doi: 10.1519/JSC.0b013e3181b2cf39.

Performance and neuromuscular adaptations following differing ratios of concurrent strength and endurance training.

Jones TW, Howatson G, Russell M, French DN.

Author information

Abstract

The interference effect attenuates **strength** and hypertrophic responses when **strength** and **endurance training** are conducted concurrently; however, the influence of **training** frequency on these responses remain unclear when varying **ratios** of **concurrent strength** and **endurance training** are performed.

Therefore, the purpose of the study was to examine the **strength**, limb girth, and **neuromuscular adaptations** to varying **ratios** of **concurrent strength** and **endurance training**. Twenty-four men with >2 years resistance **training** experience completed 6 weeks of 3 days per week of (a) **strength training** (ST), (b) **concurrent strength** and **endurance training** ratio 3:1 (CT3), (c) **concurrent strength** and **endurance training** ratio 1:1 (CT1), or (d) no **training** (CON) in an isolated limb model. Assessments of maximal voluntary contraction by means of isokinetic dynamometry leg extensions (maximum voluntary suppression [MVC]), limb girth, and **neuromuscular** responses through electromyography (EMG) were conducted at baseline, mid-intervention, and postintervention. After **training**, ST and CT3 conditions elicited greater MVC increases than CT1 and CON conditions ($p \leq 0.05$). **Strength training** resulted in significantly greater increases in limb girth than both CT1 and CON conditions ($p = 0.05$ and 0.004 , respectively). The CT3 induced significantly greater limb girth **adaptations** than CON condition ($p = 0.04$). No effect of time or intervention was observed for EMG ($p > 0.05$). I

In conclusion, greater frequencies of **endurance training** performed increased the magnitude of the interference response on **strength** and limb girth responses after 6 weeks of 3 days a week of **training**. Therefore, the frequency of **endurance training** should remain low if the primary focus of the **training** intervention is **strength** and hypertrophy.

Adolescents lack of sleep

Journal of Pediatric Orthopaedics:
March 2014 - Volume 34 - Issue 2 - p 129-133
doi: 10.1097/BPO.0000000000000151
Trauma

Chronic Lack of Sleep is Associated With Increased Sports Injuries in Adolescent Athletes

Milewski, Matthew D. MD^{*}; Skaggs, David L. MD, MMM[†]; Bishop, Gregory A. MS[‡]; Pace, J.

Abstract

Background:

Much attention has been given to the relationship between various training factors and athletic injuries, but no study has examined the impact of sleep deprivation on injury rates in young athletes. Information about sleep practices was gathered as part of a study designed to correlate various training practices with the risk of injury in adolescent athletes.

Methods:

Informed consent for participation in an online survey of training practices and a review of injury records was obtained from 160 student athletes at a combined middle/high school (grades 7 to 12) and from their parents. Online surveys were completed by 112 adolescent athletes (70% completion rate), including 54 male and 58 female athletes with a mean age of 15 years (SD=1.5; range, 12 to 18 y). The students' responses were then correlated with data obtained from a retrospective review of injury records maintained by the school's athletic department.

Results:

Multivariate analysis showed that hours of sleep per night and the grade in school were the best independent predictors of injury. Athletes who slept on average <8 hours per night were 1.7 times (95% confidence interval, 1.0-3.0; $P=0.04$) more likely to have had an injury compared with athletes who slept for ≥ 8 hours. For each additional grade in school, the athletes were 1.4 times more likely to have had an injury (95% confidence interval, 1.2-1.6; $P<0.001$).

Conclusion:

Sleep deprivation and increasing grade in school appear to be associated with injuries in an adolescent athletic population. Encouraging young athletes to get optimal amounts of sleep may help protect them against athletic injuries.

Level of Evidence: Level III.

Overweight and injury

Scand J Med Sci Sports. 2014 Feb 14. doi: 10.1111/sms.12180.

Is overweight a risk factor for sports injuries in children, adolescents, and young adults?

Kemler E, Vriend I, Paulis WD, Schoots W, van Middelkoop M, Koes B.

Abstract

Physical activity and sports participation are promoted to counteract the increased prevalence of overweight and obesity in children and young adults.

Both high body mass index and physical activity level have been associated with an increased risk of sports injuries. The objective is to determine the relationship between sports injuries and overweight in sports participants (4-24 years), taking physical activity into account. Data were obtained from the 2006-2011 "Injuries and Physical Activity in the Netherlands" survey. Analyses were based on a representative sample of 3846 sports participants (4-24 years). Univariate and multiple logistic regression analyses were applied to investigate the association between sports injury and weight status. Of all the sports participants, 14.7% were overweight. Compared with normal-weight sports participants, the odds of sustaining a sports injury was 0.73 [confidence interval (CI): 0.53-1.00, P = 0.050] for overweight sports participants; the odds for underweight sports participants was 0.80 (CI: 0.56-1.15, P = 0.226).

There is some evidence that overweight sports participants (4-24 years) do not have an increased injury risk compared with normal-weight sports participants, even when the level of physical activity is taken into account. Additional research is recommended regarding overweight people who start to participate in a physically active lifestyle.

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KEYWORDS: Youth, epidemiology, sports participation PMID: 24527837

Cold water immersion and performance

Med Sci Sports Exerc. 2014 Feb 5.

Does Hydrotherapy Help or Hinder Adaptation to Training in Competitive Cyclists?

Halson SL, Bartram J, West N, Stephens J, Argus CK, Driller MW, Sargent C, Lastella M, Hopkins WG, Martin DT.

Abstract

PURPOSE:

Cold water immersion may be beneficial for acute recovery from exercise, but it may impair long-term performance by attenuating the stimuli responsible for adaptation to training. We compared effects of cold water immersion and passive rest on cycling performance during a simulated cycling grand tour.

METHODS:

Thirty-four male endurance-trained competitive cyclists were randomized to cold water immersion (CWI) for four times per week for 15 min at 15°C or control (passive recovery) groups for 7 d of baseline training, 21 d of intensified training, and an 11 d taper. Criteria for completion of training and testing were satisfied by 10 cyclists in the CWI group (maximal aerobic power, 5.13 ± 0.21 W/kg; mean \pm SD) and 11 in the control group (5.01 ± 0.41 W/kg). Each week cyclists completed a high intensity interval cycling test and two 4-min bouts separated by 30 min. CWI was performed four times per week for 15 min at 15°C.

RESULTS:

Between baseline and taper, cyclists in the CWI group had an unclear change in overall 4-min power relative to control (2.7%, $\pm 5.7\%$), although mean power in the second effort relative to the first was likely higher for the CWI group relative to control (3.0%, $\pm 3.8\%$). The change in 1-s maximum mean sprint power in the CWI group was likely beneficial compared to control (4.4%, $\pm 4.2\%$). Differences between groups for the 10-min time trial were unclear (-0.4%, $\pm 4.3\%$).

CONCLUSION:

While some effects of CWI on performance were unclear, data from this study do not support recent speculation that CWI is detrimental to performance following increased training load in competitive cyclists.

PMID: 24504431

Mouthwash and performance

Med Sci Sports Exerc. 2014 Feb 5.

Mouth Rinsing and Ingesting a Bitter Solution Improves Sprint Cycling Performance.

Gam S, Guelfi KJ, Fournier PA.

Abstract

PURPOSE:

There is evidence that carbohydrate mouth rinsing can improve endurance exercise performance as well as muscle force production and sprint performance. Whether the oral administration of non-carbohydrate tastants also affects exercise performance is not known. The purpose of this study was to investigate whether mouth rinsing and ingesting a bitter tasting solution of quinine improves maximal sprint cycling performance.

METHODS:

Fourteen competitive male cyclists performed a 30-s maximal cycling sprint immediately after rinsing their mouth for 10 s and then ingesting a 2 mM bitter quinine solution, plain water, a 0.05% (w/v) sweet aspartame solution, or no solution at all (control). Cycling power output was recorded during the sprint. Heart rate, perceived exertion, blood lactate and blood glucose were measured pre-exercise, immediately post-exercise, and 7 min post-exercise.

RESULTS:

Quinine significantly improved mean power output by 2.4-3.9% compared with the three other conditions ($p \leq 0.021$, ES: 0.81-0.85). Peak power output in the quinine condition was higher compared with the water (3.7%, $p = 0.013$, ES = 0.71) and control (3.5% $p = 0.021$, ES: 0.84) conditions, but was not significantly different from aspartame (1.9%, $p = 0.114$, ES: 0.47). There were no significant differences in cycling performance between the water, aspartame, and control conditions. There were no differences in heart rate, perceived exertion, or blood variables between any of the conditions.

CONCLUSION:

This study shows for the first time that mouth rinsing and ingesting a bitter tasting solution immediately before a maximal sprint exercise can improve performance.

PMID: 24504430

Cardiovascular carryover in swimmers

Heart Vessels. 2014 Feb 9.

Long-term follow-up of former world-class swimmers: evaluation of cardiovascular function.

Knackstedt C, Schmidt K, Syrocki L, Lang A, Bjarnason-Wehrens B, Hildebrandt U, Predel HG.

Abstract

There is some evidence that long-term high-intensity endurance training might be associated with deterioration in cardiac function and might impose a potential risk for cardiovascular events. Thus, the intention was to retrospectively evaluate the cardiac status in former endurance athletes, particularly right ventricular (RV) dimension and function, to reveal potential cardiac damage. A group of 12 former world-class swimmers (45 ± 1.5 years) was examined 24.9 ± 4.3 years after cessation of high-intensity endurance training. They underwent history taking, physical examination, ECG, exercise testing and echocardiography. Furthermore, functional and echocardiography data that were also available from former evaluations were included in the analysis. There was a significant decline in exercise capacity. LV function was normal with a decrease in septal thickness to 9.1 ± 1.3 ($p < 0.05$) and LV diastolic diameter to 48.9 ± 5.6 ($p < 0.05$). Still, there was a remaining septal hypertrophy. RV function was 55.3 ± 4.2 % and there were normal RV dimensions adjusted for body surface area. 25 years after the cessation of endurance training there was a normal RV and LV function with a normalization of almost all diameters, still there was a mild LV hypertrophy in some athletes.

Consequently, no relevant long-term cardiac remodeling after intensive endurance training was depicted in this group of athletes.

PMID: 24510255

GAIT

Gait retraining/military

Gait retraining and incidence of medial tibial stress syndrome in army recruits

Medicine and Science in Sports and Exercise, 02/06/2014 Evidence Based Medicine

Sharma J, et al.

Abstract

Purpose: Gait retraining, comprising bio-feedback and/or an exercise intervention, might reduce the risk of musculoskeletal conditions. The purpose was to examine the effect of a gait retraining program on medial tibial stress syndrome incidence during a 26 week basic military training regimen.

Methods: A total of 450 British Army recruits volunteered. On the basis of a baseline plantar pressure variable (mean foot balance during the first 10% of stance), participants classified as at-risk of developing medial tibial stress syndrome (n = 166) were randomly allocated to an intervention (n = 83) or control (n = 83) group. The intervention involved supervised gait retraining, including exercises to increase neuromuscular control and flexibility (3 sessions per week) and bio-feedback enabling internalization of the foot balance variable (1 session per week). Both groups continued with the usual military training regimen. Diagnoses of medial tibial stress syndrome over the 26 week regimen were made by physicians blinded to group assignment. Data were modelled in a survival analysis using Cox regression, adjusting for baseline foot balance and time to peak heel rotation.

Results: The intervention was associated with a substantially reduced instantaneous relative risk of medial tibial stress syndrome versus control, with an adjusted hazard ratio of 0.25 (95% confidence interval, 0.05 to 0.53). The number needed to treat to observe one additional injury-free recruit in intervention versus control at 20 weeks was 14 (11 to 23) participants. Baseline foot balance was a nonspecific predictor of injury, with a hazard ratio per 2-SD increment of 5.2 (1.6 to 53.6).

Conclusions: The intervention was effective in reducing incidence of medial tibial stress syndrome in an at-risk military sample.

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High heels and trunk

J Back Musculoskelet Rehabil. 2014 Feb 20.

Influence of walking speed on electromyographic activity of the rectus abdominis and erector spinae during high-heeled walking.

Nam SJ1, Kim MJ2, Yim SJ3, Oh DW4, Park HJ5, Kim CY6.

Abstract

OBJECTIVE:

This study aimed to determine the effect of walking speed on the electromyographic (EMG) activity of the rectus abdominis (RA) and erector spinae (ES) muscles during treadmill high-heeled walking at different shoe heel heights.

METHODS:

Twenty-five young healthy women volunteered to participate in this study. The subjects performed treadmill walking at speeds of 3 km/h and 6 km/h for 90 seconds under 3 high-heeled conditions: barefoot, 3-cm heels, and 7-cm heels. Surface electromyography (EMG) data were collected from standard sites on the RA and ES muscles during treadmill walking.

RESULTS:

For all heel heights, the EMG activity of the RA and ES muscles was significantly higher at the 6 km/h speed than at the 3 km/h speed ($p < 0.05$). Furthermore, EMG activity increased significantly with increasing shoe heel height, regardless of the walking speed ($p < 0.05$).

CONCLUSION:

These findings indicate that walking speed and shoe heel height may contribute to the increased activity of the trunk muscle during high-heeled walking. This study provides information for future studies performed with the aim of predicting possible changes in trunk muscle activity during high-heeled walking.

KEYWORDS: Electromyography, erector spinae, high-heeled shoes, walking speed PMID: 24561783

Alteration in gait with impingement

PM R. 2014 Feb 14. pii: S1934-1482(14)00070-7. doi: 10.1016/j.pmrj.2014.02.002.

Differences in the Association of Hip Cartilage Lesions and Cam-type Femoroacetabular Impingement with Movement Patterns: A Preliminary Study.

Kumar D1, Dillon A2, Nardo L2, Link TM2, Majumdar S2, Souza RB3.

Author information

Abstract

OBJECTIVE:

Preliminary study to investigate the differences in hip movement patterns during different daily and athletic activities in individuals with cam-type femoroacetabular impingement (FAI) with and without cartilage lesions compared with controls.

DESIGN:

Controlled laboratory study using a Cross-sectional design.

SETTING:

Research Institution with Tertiary Care Medical Center.

PARTICIPANTS:

Fifteen subjects [M:F - 13:2, Age- 31.6±9.7 years (22-52), BMI- 24.9±4.6 (18.8-38.4), FAI: Control = 7:8].

METHODS:

All subjects had 3-Tesla MR imaging of the hip and also underwent 3-D motion capture during walking, deep-squat and drop landing tasks. Experienced radiologists graded cartilage lesions on clinical MR images.

OUTCOMES:

Peak kinematic and kinetic variables were compared between those with and without FAI, and those with FAI and cartilage lesions compared to subjects without cartilage lesions. Results: Subjects with FAI demonstrated no significant differences for walking or drop-landing compared to controls. However, during deep-squat, subjects with FAI adducted more and had greater internal rotation moment. Subjects with cartilage lesions in the presence of a cam-lesion demonstrated - no difference for walking; greater adduction, greater internal rotation moment and lower transverse plane range of motion during deep-squat; and greater adduction and lower internal rotation during drop-landing, compared to those without cartilage lesions.

CONCLUSIONS:

We observed differences in movement patterns between subjects with FAI compared to controls. However, the differences were more pronounced between subjects with FAI who had cartilage lesions compared to subjects who did not have cartilage lesions. These findings highlight the importance of understanding the complex interplay between bony morphology, cartilage lesions, and movement patterns in individuals with cam-type FAI.

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KEYWORDS: Drop-landing, Gait, Joint power, Kinematics, Kinetics, Squat PMID: 24534097

Limited ankle dorsi flexion

Knee. 2014 Jan 30. pii: S0968-0160(14)00009-X. doi: 10.1016/j.knee.2014.01.006.

Acute influence of restricted ankle dorsiflexion angle on knee joint mechanics during gait.

Ota S1, Ueda M2, Aimoto K3, Suzuki Y3, Sigward SM4.

Abstract

BACKGROUND:

Restrictions in range of ankle dorsiflexion (DF) motion can persist following ankle injuries. Ankle DF is necessary during terminal stance of gait, and its restricted range may affect knee joint kinematics and kinetics. The purpose of this study was to investigate the acute influence of varied levels of restricted ankle DF on knee joint sagittal and frontal plane kinematics and kinetics during gait.

METHODS:

Thirty healthy volunteers walked with a custom-designed ankle brace that restricted ankle DF. Kinematics and kinetics were collected using a 7-camera motion analysis system and two force plates. Ankle dorsiflexion was restricted in 10-degree increments, allowing for four conditions: Free, light (LR), moderate (MR) and severe restriction (SR). Knee angles and moments were measured during terminal stance.

RESULTS:

Real peak ankle DF for Free, LR, MR, and SR were $13.7 \pm 4.8^\circ$, $11.6 \pm 5.0^\circ$, $7.5 \pm 5.3^\circ$, and $4.2 \pm 7.2^\circ$, respectively. Peak knee extension angles under the same conditions were $-6.7 \pm 6.7^\circ$, $-5.4 \pm 6.4^\circ$, $-2.5 \pm 7.5^\circ$, and $0.6 \pm 7.8^\circ$, respectively, and the peak knee varus moment was $0.48 \pm 0.17 \text{ Nm/kg}$, $0.47 \pm 0.17 \text{ Nm/kg}$, $0.53 \pm 0.20 \text{ Nm/kg}$, and $0.57 \pm 0.20 \text{ Nm/kg}$. The knee varus moment was significantly increased from MR condition with an 8-degree restriction in ankle DF.

CONCLUSION:

Knee joint kinematics and kinetics in the sagittal and frontal planes were affected by reduced ankle DF during terminal stance of gait. Differences were observed with restriction in ankle DF range of approximately 8° .

LEVEL OF EVIDENCE: level III. Copyright © 2014 Elsevier B.V. All rights reserved.

KEYWORDS: Ankle dorsiflexion angle, Gait, Knee extension angle, Knee varus moment, Terminal stance PMID: 24530209

Center of Pressure

Gait Posture. 2013 Dec 27. pii: S0966-6362(13)00718-2. doi: 10.1016/j.gaitpost.2013.12.023.

Center of pressure trajectory during gait: A comparison of four foot positions.

Lugade V1, Kaufman K2.

Abstract

Knowledge of the center of pressure (COP) trajectory during stance can elucidate possible foot pathology, provide comparative effectiveness of foot orthotics, and allow for appropriate calculation of balance control and joint kinetics during gait.

Therefore, the goal of this study was to investigate the COP movement when walking at self-selected speeds with plantigrade, equinus, inverted, and everted foot positions. A total of 13 healthy subjects were asked to walk barefoot across an 8m walkway with embedded force plates. The COP was computed for each stance limb using the ground reaction forces and moments collected from three force plates. Results demonstrated that the COP excursion was 83% of the foot length and 27% of the foot width in the anterior-posterior and medial lateral directions for plantigrade walking, respectively. Regression equations explained 94% and 44% of the anterior-posterior and medial-lateral COP variability during plantigrade walking. While the range of motion and COP velocity was similar for inverted and everted walking, the COP remained on the lateral and medial aspects of the foot for these two walking conditions, respectively. A reduced anterior-posterior COP range of motion and velocity was demonstrated during equinus walking. Ankle joint motion in the frontal and sagittal planes supported this COP movement, with increased inversion and plantar flexion demonstrated during inverted and equinus conditions, respectively.

Results from this study demonstrated the COP kinematics during simulated pathological gait conditions, with the COP trajectory providing an additional tool for the evaluation of patients with pathology.

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KEYWORDS: Arch index, Center of pressure, Foot, Gait, Range of motion PMID: 24447906

RUNNING

Running shoes and Achilles tendon

Running shoes increase Achilles tendon load in walking: an acoustic propagation study

Medicine and Science in Sports and Exercise, 02/06/2014 Evidence Based Medicine
Wearing SC, et al.

Background: Footwear remains a prime candidate for the prevention and rehabilitation of Achilles tendinopathy as it is thought to decrease tension in the tendon through elevation of the heel. However, evidence for this effect is equivocal.

Purpose: This study used an acoustic transmission technique to investigate the effect of running shoes on Achilles tendon loading during barefoot and shod walking.

Methods: Acoustic velocity was measured in the Achilles tendon of twelve recreationally-active males (age, 31+/-9 years; height, 1.78+/-0.06 m; weight, 81.0+/-16.9 kg) during barefoot and shod walking at matched self-selected speed (3.4+/-0.7 km/h). Standard running shoes incorporating a 10-mm heel offset were used. Vertical ground reaction force and spatiotemporal parameters were determined with an instrumented treadmill. Axial acoustic velocity in the Achilles tendon was measured using a custom built ultrasonic device. All data were acquired at a rate of 100 Hz during 10s of steady-state walking. Statistical comparisons between barefoot and shod conditions were made using paired t-tests and repeated measure ANOVAs.

Results: Acoustic velocity in the Achilles tendon was highly reproducible and was typified by two maxima (P1, P2) and minima (M1, M2) during walking. Footwear resulted in a significant increase in step length, stance duration and peak vertical ground reaction force compared to barefoot walking. Peak acoustic velocity in the Achilles tendon (P1, P2) was significantly higher with running shoes.

Conclusions: Peak acoustic velocity in the Achilles tendon was higher with footwear, suggesting that standard running shoes with a 10-mm heel offset increase tensile load in the Achilles tendon. Although further research is required, these findings question the therapeutic role of standard running shoes in Achilles tendinopathy.

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Landing patterns

Med Sci Sports Exerc. 2014 Feb 5.

Relationship between Running Speed and Initial Foot Contact Patterns.

Breine B, Malcolm P, Frederick EC, De Clercq D.

Abstract

PURPOSE:

This study assessed initial foot contact patterns (IFCP) in a large group of distance runners and the effect of speed on the IFCP.

METHODS:

We determined the strike index, to classify the runners in IFCP groups, at 4 speeds (3.2, 4.1, 5.1, 6.2 m[BULLET OPERATOR]s) by measuring center of pressure (COP) with a 2 m plantar pressure plate. Such a system allows a direct localization of the COP on the plantar footprint and has a low threshold value (2.7 N·cm) resulting in more accurate COP data at low ground reaction forces than when obtained from force plate.

RESULTS:

The IFCP distribution evolves from mostly initial rearfoot contact (IRFC) (82%) at 3.2 m[BULLET OPERATOR]s to more anterior foot contacts with about equal distribution of IRFC (46%) and initial midfoot or forefoot contact (IMFC+IFFC) (54%) at 6.2 m[BULLET OPERATOR]s. About 44% of the IRFC runners showed atypical COP patterns with fast anterior displacement of the COP along the lateral shoe margin. Apart from the different COP patterns, these atypical IRFC were also characterized by a significantly higher instantaneous vertical loading rate than the typical IRFC patterns.

CONCLUSION:

The IFCP distribution changes were due to intra-individual alterations in IFCP at higher speeds. That is, 45% of the runners made one or even two 'transitions' towards a more anterior IFCP (and 3% shows some other type of transition between initial foot contact styles as speed increases). Although, 52% of the runners remained with the same IFCP.

PMID: 24504424

Forefoot running

Med Sci Sports Exerc. 2014 Feb 5.

Relationship between Running Speed and Initial Foot Contact Patterns.

Breine B, Malcolm P, Frederick EC, De Clercq D.

Abstract

PURPOSE:

This study assessed initial foot contact patterns (IFCP) in a large group of distance runners and the effect of speed on the IFCP.

METHODS:

We determined the strike index, to classify the runners in IFCP groups, at 4 speeds (3.2, 4.1, 5.1, 6.2 m[BULLET OPERATOR]s) by measuring center of pressure (COP) with a 2 m plantar pressure plate. Such a system allows a direct localization of the COP on the plantar footprint and has a low threshold value (2.7 N·cm) resulting in more accurate COP data at low ground reaction forces than when obtained from force plate.

RESULTS:

The IFCP distribution evolves from mostly initial rearfoot contact (IRFC) (82%) at 3.2 m[BULLET OPERATOR]s to more anterior foot contacts with about equal distribution of IRFC (46%) and initial midfoot or forefoot contact (IMFC+IFFC) (54%) at 6.2 m[BULLET OPERATOR]s. About 44% of the IRFC runners showed atypical COP patterns with fast anterior displacement of the COP along the lateral shoe margin. Apart from the different COP patterns, these atypical IRFC were also characterized by a significantly higher instantaneous vertical loading rate than the typical IRFC patterns.

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PMID: 24504424

Heel pad mobility barefoot

Med Sci Sports Exerc. 2014 Feb 5.

Force-Deformation Properties of the Human Heel Pad during Barefoot Walking.

Wearing SC, Hooper SL, Dubois P, Smeathers JE, Dietze A.

Abstract

INTRODUCTION:

The plantar heel pad is a specialized fibroadipose tissue that attenuates and, in part, dissipates the impact energy associated with heel strike. Although near maximal deformation of the heel pad has been shown during running, in vivo measurement of the deformation and structural properties of the heel pad during walking remains largely unexplored. This study employed a fluoroscope, synchronized with a pressure platform, to obtain force-deformation data for the heel pad during walking.

METHODS:

Dynamic lateral foot radiographs were acquired from 6 male and 10 female adults (age, 45 ± 10 yrs; height, 1.66 ± 0.10 m; and weight, 80.7 ± 10.8 kg), while walking barefoot at preferred speeds. The inferior aspect of the calcaneus was digitized and the sagittal thickness and deformation of the heel pad relative to the support surface calculated. Simultaneous measurement of the peak force beneath the heel was used to estimate the principal structural properties of the heel pad.

RESULTS:

Transient loading profiles associated with walking induced rapidly changing deformation rates in the heel pad and resulted in irregular load-deformation curves. The initial stiffness (32 ± 11 N.mm) of the heel pad was an order of magnitude lower than its final stiffness (212 ± 125 N.mm) and on average, only 1.0 J of energy was dissipated by the heel pad with each step during walking. Peak deformation (10.3 mm) approached that predicted for the limit of pain tolerance (10.7 mm).

CONCLUSION:

These findings suggest the heel pad operates close to its pain threshold even at speeds encountered during barefoot walking and provides insight as to why barefoot runners may adopt 'forefoot' strike patterns that minimize heel loading.

PMID: 24504425

Rearfoot Vs forefoot running

Joint kinetics in rearfoot versus forefoot running: implications of switching technique

□

Medicine and Science in Sports and Exercise, 02/06/2014 Evidence Based Medicine

Stearne SM, et al.

Abstract

Purpose: To better understand the mechanical factors differentiating forefoot and rearfoot strike running, as well as the mechanical consequences of switching techniques, we assessed lower limb joint kinetics in habitual and imposed techniques in both groups.

Methods: All participants performed both RFS and FFS techniques on an instrumented treadmill at 4.5ms⁻¹ while force and kinematic data were collected.

Results: Total (sum of ankle, knee and hip) lower limb work and average power did not differ between habitual RFS and FFS runners. However, moments and negative work and power during stance were greater at the knee in RFS and at the ankle in FFS techniques. When habitual RFS runners switched to an imposed FFS they were able to replicate the sagittal plane mechanics of a habitual FFS, however the ankle external rotation moment was increased by 33%, while knee abduction moments were not reduced, remaining 48.5% higher than a habitual FFS. Additionally, total positive and negative lower limb average power was increased by 17% and 9%, respectively. When habitual FFS runners switched to an imposed RFS they were able to match the mechanics of habitual RFS runners with the exception of knee abduction moments, which remained 38% lower than a habitual RFS and, surprisingly, a reduction of total lower limb positive average power of 10.5%.

Conclusions: There appears to be no clear overall mechanical advantage of a habitual FFS or RFS. Switching techniques may have different injury implications given the altered distribution in loading between joints but should be weighed against the overall effects on limb mechanics; adopting an imposed RFS may prove the most beneficial given the absence of any clear mechanical performance decrements.

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PAIN

Method for pain reduction

Pain Med. 2014 Jan 8. doi: 10.1111/pme.12338.

A Self-Administered Method of Acute Pressure Block of Sciatic Nerves for Short-Term Relief of Dental Pain: A Randomized Study.

Wang X, Zhao W, Wang Y, Hu J, Chen Q, Yu J, Wu B, Huang R, Gao J, He J.

Abstract

OBJECTIVES:

While stimulation of the peripheral nerves increases the pain threshold, chronic pressure stimulation of the sciatic nerve is associated with sciatica. We recently found that acute pressure block of the sciatic nerve inhibits pain. Therefore, we propose that, the pain pathology-causing pressure is chronic, not acute. Here, we report a novel self-administered method: acute pressure block of the sciatic nerves is applied by the patients themselves for short-term relief of pain from dental diseases.

DESIGN:

This was a randomized, single-blind study.

SETTING:

Hospital patients.

PATIENTS:

Patients aged 16-60 years with acute pulpitis, acute apical periodontitis, or pericoronitis of the third molar of the mandible experiencing pain ≥ 3 on the 11-point numerical pain rating scale.

INTERVENTIONS:

Three-minute pressure to sciatic nerves was applied by using the hands (hand pressure method) or by having the patients squat to force the thigh and shin as tightly as possible on the sandwiched sciatic nerve bundles (self-administered method).

OUTCOMES:

The primary efficacy variable was the mean difference in pain scores from the baseline.

RESULTS:

One hundred seventy-two dental patients were randomized. The self-administered method produced significant relief from pain associated with dental diseases ($P \leq 0.001$). The analgesic effect of the self-administered method was similar to that of the hand pressure method.

CONCLUSIONS:

The self-administered method is easy to learn and can be applied at any time for pain relief. We believe that patients will benefit from this method.

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KEYWORDS: Complementary Therapies, Dental Diseases, Pain, Pressure, Sciatic Nerve, Self-Administered Method PMID: 24400593

Causes of MS pain

Pain. 2014 Feb 18. pii: S0304-3959(14)00056-6. doi: 10.1016/j.pain.2014.01.033.

Predictive risk factors for chronic regional and multiple body sites musculoskeletal pain. A 5-year prospective study in a working population.

Herin F1, Vézina M2, Thaon I3; ESTEVE group, Soulat JM1, Paris C4.

Abstract

The role of psychosocial and physical factors in the development of musculoskeletal pain has now been clearly demonstrated. But it is unclear whether these factors contribute to specific regional musculoskeletal pain or to multisite pain.

The main goal of this study was to assess the impact of work-related factors according to gender to the development of regional and multisite musculoskeletal pain. A total of 12,591 subjects (65% men) born in 1938, 1943, 1948 and 1953 participating in a French longitudinal prospective epidemiological survey in 1990-1995 (ESTEVE) were eligible. Personal factors and work exposure were assessed by self-administered questionnaires. Statistical associations between chronic musculoskeletal pain (regional body site or multisite), personal and occupational factors were analysed using logistic regression modelling.

The incidence of regional musculoskeletal pain and multisite pain in 1995 were respectively 17% and 25.6%. For women, highly repetitive movements predicted neck/shoulder pain, posture and vibrations predicted arm and low back pain, effort with tools predicted arm pain. For men, forceful effort and vibrations predicted neck/shoulder pain, posture and forceful effort predicted lower limb and low back pain, forceful effort and effort with tools predicted arm pain. Physical constraints (forceful effort or vibrations) were associated with multisite pain in both genders. Only for women, psychological factors are predictive risk factor of upper limb pain and of three or four painful anatomical sites.

These results support the hypothesis that some physical and psychological work-related factors are predictive of regional or multisite musculoskeletal pain but differ according to gender. Gender differences and risk factors of work-related musculoskeletal pain should be also taken into account to more effectively target preventive measures.

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KEYWORDS: Chronic multisite pain, France, Gender, General working population, Low back pain, Neck/shoulder pain, Prospective study, Upper and lower limb pain, Work-related physical and psychological factors PMID: 24561229

Neonate pain

J Clin Nurs. 2014 Jan 30. doi: 10.1111/jocn.12549.

Efficacy of swaddling and heel warming on pain response to heel stick in neonates: a randomised control trial.

Shu SH, Lee YL, Hayter M, Wang RH.

Abstract

AIMS AND OBJECTIVES:

To determine the efficacy of swaddling and heel warming on pain response in neonates following heel stick.

BACKGROUND:

Swaddling has been suggested to reduce pain response in neonates during heel stick. Heel warming is also often performed for drawing blood easily before heel stick. However, the efficacy of both on pain response is unclear.

DESIGN:

A randomised controlled study was used.

METHODS:

Twenty-five neonates were randomly assigned to each of the control, swaddling and heel-warming groups. Heart rate, oxygen saturation Neonatal Infant Pain Scale and duration of crying were used to assess pain reactivity and pain recovery. A greater heart rate and Neonatal Infant Pain Scale increase, or oxygen saturation decrease, indicated higher pain reactivity. A longer duration of heart rate and oxygen saturation changes after heel stick back to baseline indicated a longer pain recovery.

RESULTS:

The decrease in oxygen saturation in swaddling group was significantly greater than that in heel-warming group. The increase in the Neonatal Infant Pain Scale in control group was significantly higher than that in swaddling group. The heart rate recovery time in control group and swaddling group was significantly longer than that in heel-warming group. The oxygen saturation recovery time in control group was significantly longer than that in heel-warming group. The duration of crying in control group was significantly longer than those in swaddling group and heel-warming group.

CONCLUSION:

Both swaddling and heel warming decreased the pain response of neonates during heel stick. Heel warming resulted in a lower pain response than did swaddling for neonates, particularly in terms of pain recovery.

RELEVANCE TO CLINICAL PRACTICE:

Heel warming could become a routine practice to decrease the pain response of neonates during heel stick.

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KEYWORDS: heel stick, heel warming, neonates, pain responses, swaddling PMID: 24476226

Pain Model

The pain and movement reasoning model: introduction to a simple tool for integrated pain assessment

- Jones LE, Franziskus D.
- Manual Therapy Feb 2014
- ^MAbstract

Pain is no longer considered to be simply the transmission of nociception, but rather an output subsequent to the complex interactions of homeostatic systems. Manual therapists' clinical reasoning needs to incorporate this complexity in order to develop individualised effective treatment plans.

Pain classification strategies attempting to assist clinical reasoning traditionally define multiple types of pain - nociceptive, neuropathic, centrally sensitised – potentially fitting elements of the pain experience to linear independent systems, rather than embracing the multiple dimensions. It is our contention that pain should not be classified unidimensionally. In all pain states consideration should be given to the combined influence of physiological, cognitive, emotional and social inputs, all of which have the potential to influence nociception.

The Pain and Movement Reasoning Model presented in this paper attempts to capture the complexity of the human pain experience by integrating these multiple dimensions into a decision making process. Three categories have been created to facilitate this - central modulation, regional influences, and local stimulation. The Model allows for the identification of a predominant element to become the focus of treatment but also for the identification of changes to clinical presentation, where new treatment targets can emerge.

Keywords: Physiotherapy; clinical reasoning; pain; movement

Pregnancy LBP and joint laxity

Finger joint laxity, number of previous pregnancies and pregnancy induced back pain in a cohort study

Anne Lindgren and Per Kristiansson

BMC Pregnancy and Childbirth 2014, **14**:61 doi:10.1186/1471-2393-14-61

Background

General joint hypermobility is estimated to affect about 10% of the population and is a prerequisite of heritable connective tissue disorders where fragile connective tissue is a prominent feature. Pregnancy induced back pain is common whereas about 10% of women still have disabling pain several years after childbirth. The pathogenesis of the pain condition is uncertain, although several risk factors are suggested including general joint hypermobility. In the present study, the possible association of peripheral joint mobility in early pregnancy on the incidence of back pain with onset during pregnancy and persisting after childbirth was explored.

Methods

A cohort of 200 pregnant women recruited from antenatal health care clinics was assessed by questionnaire and clinical examination, including measurement of passive abduction of the left fourth finger, throughout pregnancy and at 13 weeks postpartum. Comparisons were made between women with and without back pain. Statistical tests used were chi²-test, t-test, Spearman correlation and multiple logistic regression.

Results

In the cohort, the mean passive abduction angle of the left fourth finger increased from 40.1[degree sign] in early pregnancy to 41.8[degree sign] at the postpartum appointment. At the postpartum appointment, women in the back pain group had a significantly larger mean passive abduction angle of the left fourth finger of 4.4[degree sign], twice as many previous pregnancies and deliveries, and more than twice as frequent back pain in previous pregnancy, as compared with women with no persistent back pain. A similar pattern was displayed in late pregnancy. In a multiple regression analysis, the passive abduction angle of the left fourth finger in early pregnancy and the number of previous pregnancies were positively, significantly and independently associated to the incidence of back pain in late pregnancy and postpartum.

Conclusions

Finger joint laxity as a reflection of constitutional weakness of connective tissue and number of previous pregnancies were associated with the development of back pain induced in pregnancy and persisting after childbirth. These factors may provide a foundation for development of targeted prevention strategies, but this have to be confirmed in future research including measurement of general joint laxity.

Parasympathetic changes with pain

Pain Pract. 2014 Feb 27. doi: 10.1111/papr.12177.

Lowered Parasympathetic Activity in Apparently Healthy Subjects with Self-Reported Symptoms of Pain: Preliminary Results from a Pilot Study.

Koenig JI, Jarczok MN, Ellis RJ, Warth M, Hillecke TK, Thayer JF.

Abstract

OBJECTIVES:

The aim was to evaluate differences in the autonomic nervous system (ANS) activity, indexed by heart rate variability (HRV) in apparently healthy subjects with self-reported symptoms of pain (SRSP) within an exploratory analysis.

METHODS:

HRV data from 14 apparently healthy male individuals were analyzed to address potential differences in subjects with and without SRSP. SRSP was assessed using the four pain-related items from the symptom checklist (SCL-90R). Subjects were stratified based on the presence of SRSP.

RESULTS:

Parasympathetic activity, indexed by pNN50, RMSSD, and high frequency (HF) spectrum of HRV, was lower in subjects with SRSP. Low frequency (LF) HRV and the LF/HF ratio were greater in subjects with SRSP. However, analysis of variance revealed no significant differences between the groups. Pearson correlations showed a correlation of pNN50, HF, LF, and LF/HF ratio and the presence and frequency of SRSP. Measures of parasympathetic activity (pNN50 and HF) were inversely associated with more SRSP, indicating that subjects with more frequent SRSP show decreased parasympathetic activity.

CONCLUSIONS:

Consistent with evidence on changes in HRV in patients with clinical conditions of chronic or recurrent pain, this is the first study to show that healthy individuals who report symptoms of pain may have lower parasympathetic activity revealed by measures of HRV.

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KEYWORDS: autonomic nervous system, heart rate variability, parasympathetic activity, self-reported pain PMID: 24571545

Pain drawings

Pain Pract. 2014 Feb 27. doi: 10.1111/papr.12173.

Associations Between Pain drawing and Psychological Characteristics of Different Body Region Pains.

Hayashi K1, Arai YC, Morimoto A, Aono S, Yoshimoto T, Nishihara M, Osuga T, Inoue S, Ushida T.

Abstract

BACKGROUND:

Pain drawings have frequently been used for documentation of pain and a convenient diagnosis tool. Pain drawings were found to be associated with psychological states in chronic patients with low back pain. Few researchers have investigated pain drawings except in low back pain. The aim of this study was to investigate the pain, pain drawings, psychological characteristics, and pain interference in the head, neck-shoulder (NS), and low-back/lower-limb (LB-LL) regions among patients with chronic pain.

METHODS:

We included a total of 291 patients with new chronic pain (headache, 62; NS pain, 87; LB-LL pain, 142). The pain drawings and scores of 10-cm Visual Analogue Scale (VAS), Hospital Anxiety and Depression Scale (HADS), Pain Catastrophizing Scale (PCS), Short-Form McGill Pain Questionnaire (SF-MPQ), and Pain Disability Assessment Scale (PDAS) were extracted from medical records. A subset of 60 pain drawings was scored by senior and junior evaluators to assess inter-rater agreement. We investigated the correlation between pain drawings and VAS, HADS, PCS, SF-MPQ, and PDAS in each body region group at the initial visit. Moreover, almost all patients received nonsurgical treatment as a follow-up and were investigated using VAS after treatment.

RESULTS:

The reliability of pain drawings was substantial with an interevaluator reliability in headache, NS, and LB-LL pain. Nonorganic pain drawings were associated with psychological disturbances in NS and LB-LL pain, but not headache. Poor outcomes were associated with nonorganic drawings in LB-LL pain, but not in the case of headache or NS pain.

CONCLUSIONS:

Our results suggest that the characteristics of patients with nonorganic drawings differ according to body regions.

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KEYWORDS: back pain, headache, neck pain, nonorganic pain drawing, pain assessment, pain drawing, psychology PMID: 24571521

Pain inhibition

Pain. 2014 Feb 3. pii: S0304-3959(14)00045-1. doi: 10.1016/j.pain.2014.01.024.

Adaptability to pain is associated with potency of local pain inhibition, but not conditioned pain modulation: A healthy human study.

Zheng Z1, Wang K2, Yao D2, Xue CC3, Arendt-Nielsen L2.

Abstract

This study investigated the relationship between pain sensitivity, adaptability, and potency of endogenous pain inhibition, including conditioned pain modulation (CPM) and local pain inhibition. Forty-one healthy volunteers (20 male, 21 female) received conditioning stimulation (CS) over 2 sessions in a random order: tonic heat pain (46°C) on the right leg for 7minutes and cold pressor pain (1°C to 4°C) on the left hand for 5minutes. Participants rated the intensity of pain continuously using a 0 to 10 electronic visual analogue scale. The primary outcome measures were pressure pain thresholds (PPT) measured at the heterotopic and homotopic location to the CS sites before, during, and 20minutes after CS. Two groups of participants, pain adaptive and pain nonadaptive, were identified based on their response to pain in the cold pressor test. Pain-adaptive participants showed a pain reduction between peak pain and pain at end of the test by at least 2 of 10 (n=16); whereas the pain-nonadaptive participants reported unchanged peak pain during 5-minute CS (n=25). Heterotopic PPTs during the CS did not differ between the 2 groups. However, increased homotopic PPTs measured 20minutes after CS correlated with the amount of pain reduction during CS.

These results suggest that individual sensitivity and adaptability to pain does not correlate with the potency of CPM. Adaptability to pain is associated with longer-lasting local pain inhibition.

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KEYWORDS: Conditioned pain modulation, Diffuse noxious inhibition control, Pain adaptability, Pain sensitivity, Pain tolerance, Segmental inhibition, Tonic pain PMID: 24502842

Cognitive function and chronic pain

Brain. 2014 Mar;137(Pt 3):904-17. doi: 10.1093/brain/awt354. Epub 2014 Jan 17.

Does cognitive functioning predict chronic pain? Results from a prospective surgical cohort.

Attal N1, Masselin-Dubois A, Martinez V, Jayr C, Albi A, Fermanian J, Bouhassira D, Baudic S.

Author information

Abstract

It is well established that chronic pain impairs cognition, particularly memory, attention and mental flexibility. Overlaps have been found between the brain regions involved in pain modulation and cognition, including in particular the prefrontal cortex and the anterior cingulate cortex, which are involved in executive function, attention and memory.

However, whether cognitive function may predict chronic pain has not been investigated. We addressed this question in surgical patients, because such patients can be followed prospectively and may have no pain before surgery. In this prospective longitudinal study, we investigated the links between executive function, visual memory and attention, as assessed by clinical measurements and the development of chronic pain, its severity and neuropathic symptoms (based on the 'Douleur Neuropathique 4' questionnaire), 6 and 12 months after surgery (total knee arthroplasty for osteoarthritis or breast surgery for cancer). Neuropsychological tests included the Trail-Making Test A and B, and the Rey-Osterrieth Complex Figure copy and immediate recall, which assess cognitive flexibility, visuospatial processing and visual memory. Anxiety, depression and coping strategies were also evaluated. In total, we investigated 189 patients before surgery: 96% were re-evaluated at 6 months, and 88% at 12 months. Multivariate logistic regression (stepwise selection) for the total group of patients indicated that the presence of clinical meaningful pain at 6 and 12 months (pain intensity $\geq 3/10$) was predicted by poorer cognitive performance in the Trail Making Test B ($P = 0.0009$ and 0.02 for pain at 6 and 12 months, respectively), Rey-Osterrieth Complex Figure copy ($P = 0.015$ and 0.006 for pain at 6 and 12 months, respectively) and recall ($P = 0.016$ for pain at 12 months), independently of affective variables. Linear regression analyses indicated that impaired scores on these tests predicted pain intensity ($P < 0.01$) and neuropathic symptoms in patients with pain ($P < 0.05$), although the strength of the association was less robust for neuropathic symptoms.

These results were not affected by the type of surgery or presurgical pain, similar findings being obtained specifically for patients who initially had no pain. In conclusion, these findings support, for the first time, the notion that premorbid limited cognitive flexibility and memory capacities may be linked to the mechanisms of pain chronicity and probably also to its neuropathic quality. This may imply that patients with deficits in executive functioning or memory because of cerebral conditions have a greater risk of pain chronicity after a painful event.

KEYWORDS: attention, chronic pain, cognitive flexibility, memory, neuropathic pain PMID: 24441173

Impact on brain of chronic LBP

J Neurosci. 2004 Nov 17;24(46):10410-5.

Chronic back pain is associated with decreased prefrontal and thalamic gray matter density.

Apkarian AV, Sosa Y, Sonty S, Levy RM, Harden RN, Parrish TB, Gitelman DR.

Abstract

The role of the brain in chronic pain conditions remains speculative. We compared brain morphology of 26 chronic back pain (CBP) patients to matched control subjects, using magnetic resonance imaging brain scan data and automated analysis techniques. CBP patients were divided into neuropathic, exhibiting pain because of sciatic nerve damage, and non-neuropathic groups. Pain-related characteristics were correlated to morphometric measures. Neocortical gray matter volume was compared after skull normalization. Patients with CBP showed 5-11% less neocortical gray matter volume than control subjects. The magnitude of this decrease is equivalent to the gray matter volume lost in 10-20 years of normal aging. The decreased volume was related to pain duration, indicating a 1.3 cm³ loss of gray matter for every year of chronic pain. Regional gray matter density in 17 CBP patients was compared with matched controls using voxel-based morphometry and nonparametric statistics. Gray matter density was reduced in bilateral dorsolateral prefrontal cortex and right thalamus and was strongly related to pain characteristics in a pattern distinct for neuropathic and non-neuropathic CBP.

Our results imply that CBP is accompanied by brain atrophy and suggest that the pathophysiology of chronic pain includes thalamocortical processes.

PMID: 15548656

Hypermobility sensitization

Clin Rheumatol. 2014 Feb 4.

Chronic pain in patients with the hypermobility type of Ehlers-Danlos syndrome: evidence for generalized hyperalgesia.

Rombaut L1, Scheper M, De Wandele I, De Vries J, Meeus M, Malfait F, Engelbert R, Calders P.

Abstract

BACKGROUND:

Chronic widespread pain is highly present in patients with the Ehlers-Danlos syndrome hypermobility type (EDS-HT), but up to now, evidence for generalized hyperalgesia is lacking.

PURPOSE:

The aim of this study is to investigate whether pressure pain thresholds (PPTs) at both symptomatic and asymptomatic body areas differ in EDS-HT patients compared to healthy subjects.

METHODS:

Twenty-three women with EDS-HT and 23 gender- and age-matched healthy controls participated. All subjects marked on Margolis Pain Diagram where they felt pain lasting longer than 24 h in the past 4 weeks. Then, they completed several questionnaires assessing pain cognitions, fatigue, disability, and general health status, in order to take the possible influence of these factors on PPTs into account. Patients also completed a form concerning the type of pain they experienced. Thereupon, a blinded researcher assessed PPTs at 14 body locations on the trunk and extremities. PPTs were compared for the two complete groups. In addition, PPTs of patients and controls who did not report pain in a respective zone were compared.

RESULTS:

PPTs of the patients were significantly lower compared to those of the control group, also when pain-free samples per zone were compared. The mean (SD) PPT was 2.9 (1.62) kg/cm² in the EDS-HT patients and 5.2 (1.88) kg/cm² in the controls ($P < 0.001$). No confounding factors responsible for the observed differences could be revealed. In half of the patient group, a predominantly neuropathic pain component was likely present.

CONCLUSIONS:

This study provides evidence for the existence of hyperalgesia even in asymptomatic areas (generalized secondary hyperalgesia). The generalized hyperalgesia may represent the involvement of a sensitized central nervous system, which inquires an adapted pain management for this patient group.

Inflammatory

Exp Neurol. 2014 Jan 17. pii: S0014-4886(14)00022-3. doi: 10.1016/j.expneurol.2014.01.009.

The pivotal role played by lipocalin-2 in chronic inflammatory pain.

Jha MK1, Jeon S2, Jin M1, Ock J1, Kim JH1, Lee WH3, Suk K4.

Abstract

Lipocalin-2 (LCN2) is an acute phase protein induced in response to injury, infection or other inflammatory stimuli.

Based on the previously reported involvement of LCN2 in chemokine induction and in the recruitment of neutrophils at the sites of infection or tissue injury, we investigated the role of LCN2 in the pathogenesis of chronic/persistent inflammatory pain hypersensitivity. In the complete Freund's adjuvant (CFA)-induced chronic inflammatory pain model, LCN2 expression was strongly induced in the ipsilateral hindpaws, peaking at 12h after CFA injection and then gradually subsiding. In CFA-injected hindpaw tissues, LCN2 and its receptor 24p3R were mainly expressed in infiltrating neutrophils and macrophages. CFA-induced thermal hyperalgesia and mechanical allodynia were significantly diminished in Lcn2-deficient mice compared to wild-type animals. Furthermore, neutrophil infiltration, myeloperoxidase activity, expression of TNF- α , IL-1 β and MIP-2 in CFA-injected hindpaws, and spinal glial activation were markedly reduced by Lcn2 deficiency. An intraplantar injection of recombinant LCN2 protein induced thermal and mechanical hypersensitivities in naïve mice, and this was accompanied by neutrophil and macrophage infiltration into the hindpaws and glial activation in the dorsal horn of the spinal cord.

Taken together, our results show that inflammatory cell-derived LCN2 at the sites of inflammation plays important roles in central sensitization and the subsequent nociceptive behavior in the rodent model of chronic inflammatory pain.

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KEYWORDS: CFA, Chronic inflammatory pain, DRG, Glia, H&E, Hindpaw, IR, Inflammation, KO, LCN2, Lipocalin-2, MPO, Macrophage, Neutrophil, PWL, PWT, Proalgesic mediators, Spinal cord, WT, complete Freund's adjuvant, dorsal root ganglia, hematoxylin and eosin, immunoreactivity, knockout, lipocalin-2, myeloperoxidase, paw withdrawal latency, paw withdrawal threshold, wild-type PMID: 24440229

Complex regional Pain

Outcomes

J Pain. 2014 Feb 11. pii: S1526-5900(14)00565-3. doi: 10.1016/j.jpain.2014.01.500.

The Outcome of Complex Regional Pain Syndrome Type 1: A Systematic Review.

Bean DJ1, Johnson MH2, Kydd RR3.

Abstract

The purpose of this systematic review was to examine the outcome of complex regional pain syndrome (CRPS) type-1. We searched Medline, Embase and Psychinfo for relevant studies, and included 18 studies, with 3991 participants, in this review. The following data were extracted: study details, measurement tools used, and rates or severity scores for the symptoms/signs of CRPS at baseline and follow-up, or in groups of patients with different disease durations. A quality assessment revealed significant limitations in the literature, with many studies utilising different diagnostic criteria. The 3 prospective studies demonstrated that for many patients, symptoms improve markedly within 6-13 months of onset. The 12 retrospective studies had highly heterogeneous findings, documenting lasting impairments in many patients. The 3 cross-sectional studies showed that rates of pain and sensory symptoms were highest amongst those with the longest duration of CRPS. Additionally, most studies showed that motor symptoms (stiffness and weakness) were the most likely to persist whilst sudomotor and vasomotor symptoms were the most likely to improve. Overall, this suggests that some CRPS patients make a good early recovery whilst others develop lasting pain and disability. As yet little is known about the prognostic factors that might differentiate between these groups.

PERSPECTIVE:

We found evidence that many CRPS patients recover within 6-13 months, but a significant number experience some lasting symptoms, and some experience chronic pain and disability. The quality of the evidence was poor. Future research should examine the factors associated with recovery and identify those at risk of poor outcomes.

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KEYWORDS: Complex Regional Pain Syndrome, Outcome, Prognosis, Recovery, Systematic Review PMID: 24530407

Fibromyalgia

Somatoform disorder

Eur J Pain. 2014 Jan 23. doi: 10.1002/j.1532-2149.2014.00453.x.

Fibromyalgia syndrome: A somatoform disorder?

Häuser W, Henningsen P.

BACKGROUND AND OBJECTIVE:

Whether fibromyalgia syndrome (FMS) can be classified as a somatoform disorder is under debate.

DATABASES AND DATA TREATMENT:

Literature searches on the classification of FMS as a somatoform disorder were performed in Medline and in evidence-based guideline databases.

RESULTS:

A somatoform disorder is defined by medically unexplained somatic symptoms that persist for at least 6 months and lead to a significant impairment of the ability to function in everyday life. The nature and extent of the symptoms or the distress and pre-occupation of the patient cannot be explained fully by a general medical condition or by the direct effect of a substance, and are not attributable to another mental disorder. Emotional and psychosocial conflicts play a major role in the onset, severity, exacerbation or maintenance of the physical symptoms. There is disagreement in the FMS research community on the existence of somatic factors sufficiently explaining FMS symptoms. Psychosocial factors play a major role in the onset, exacerbation or maintenance of FMS symptoms in the majority of patients. A biopsychosocial model of interacting biological and psychosocial factors in the predisposition, onset and maintenance of FMS symptoms is more appropriate than the dichotomy between a somatic disease and a mental (somatoform) disorder.

CONCLUSIONS:

The clinical features of FMS and persistent somatoform pain disorder or somatization disorder according to the International Classification of Diseases (ICD)-10 overlap in individuals with chronic widespread pain without specific somatic disease factors. FMS is not synonymous with somatoform disorder.

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PMID: 24453056

Kinesiophobia and FM

Clin Rheumatol. 2014 Jan 31.

A cross-sectional survey assessing sources of movement-related fear among people with fibromyalgia syndrome.

Russek L1, Gardner S, Maguire K, Stevens C, Brown EZ, Jayawardana V, Mondal S.

Abstract

BACKGROUND:

Fear of movement may contribute to functional limitations and loss of well-being among individuals with fibromyalgia (FM).

OBJECTIVES:

The objectives of this study were to assess factors contributing to movement-related fear and to explore relationships among these factors, function and wellness, in a widespread population of people with FM.

METHODS:

This was an internet survey of individuals with FM. Respondents completed a battery of surveys including the Fibromyalgia Impact Questionnaire-Revised (FIQR), Tampa Scale of Kinesiophobia (TSK), Activities-Specific Balance Confidence Scale (ABC), Primary Care Posttraumatic Stress Disorder screen (PC-PTSD), Vertigo Symptom Scale (VSS-SF), a joint hypermobility syndrome screen (JHS), and screening questions related to obsessive-compulsive personality disorder (OCPD), physical activity, work status, and demographics. Analysis included descriptive statistics, Pearson product-moment correlations, and linear regression. Over a 2-year period, 1,125 people (97.6 % female) completed the survey battery.

RESULTS:

Kinesiophobia was present in 72.9 % of the respondents, balance confidence was compromised in 74.8 %, PTSD likely in 60.4 %, joint hypermobility syndrome likely in 46.6 %, and OCPD tendencies in 26.8 %. The total FIQR and FIQR perceived function subscores were highly correlated ($p < 0.0005$, $r > 0.4$) with pain, kinesiophobia, balance confidence, and vertigo. Reported activity level had poor correlation ($r < 0.25$) with all measured variables. Pain, ABC, VSS, and TSK predicted FIQR and FIQR-pf, explaining 65 and 48 % of the variance, respectively.

CONCLUSIONS:

Kinesiophobia, balance complaints, vertigo, PTSD, and joint hypermobility were common in this population of people with FM. Sources of movement-related fear correlated to overall wellness and perceived function as measured by the FIQR and FIQR-pf.

Pain with exercise

J Clin Neurophysiol. 2014 Feb;31(1):94-8. doi: 10.1097/WNP.0000000000000025.

Corticomotor excitability during a noxious stimulus before and after exercise in women with fibromyalgia.

Hoeger Bement MK1, Weyer AD, Yoon T, Hunter SK.

Abstract

SUMMARY:

The purposes of this study were to assess corticomotor excitability in people with fibromyalgia during a noxious stimulus before and after fatiguing exercise and examine associations with pain perception.

METHODS:

Fifteen women with fibromyalgia completed three sessions: one familiarization and two experimental. The experimental sessions were randomized and involved measurement of pain perception and motor evoked potentials before and after (1) quiet rest and (2) isometric contraction of the elbow flexor muscles. Motor evoked potential amplitude of brachioradialis muscle was measured following transcranial magnetic stimulation delivered before, during, and after a noxious mechanical stimulus.

RESULTS:

After quiet rest, there was no change in pain perception. After the submaximal contraction, there was considerable variability in the pain response. Based on the changes in the experimental pain, subjects were divided into three groups (increase, decrease, and no change in pain). There was an interaction between pain response and the pain-induced change in motor evoked potentials.

CONCLUSIONS:

Those individuals who had an increase in motor evoked potentials during the pain test had an increase in pain after exercise. Thus, women with fibromyalgia were classified based on their pain response to exercise, and this response was associated with the change in corticomotor excitability during the application of a noxious stimulus.

Exercise

PM R. 2014 Feb 14. pii: S1934-1482(14)00075-6. doi: 10.1016/j.pmrj.2014.02.007.

Decreased Physical Activity Attributable to Higher Body Mass Index Influences Fibromyalgia Symptoms.

Vincent A1, Clauw D2, Oh TH3, Whipple MO3, Toussaint LL4.

Abstract

BACKGROUND:

Although previous studies report associations between increased body mass index (BMI) and fibromyalgia symptoms, there is uncertainty whether this relationship is driven by physical factors, psychological factors, or both.

OBJECTIVE:

To assess these relationships in a clinical sample of patients with fibromyalgia.

DESIGN:

Cross-sectional study SETTING: Tertiary care facility PATIENTS: 686 patients from an existing national fibromyalgia registry.

METHODS:

Patients completed a demographic form and self-report questionnaires including the Fibromyalgia Impact Questionnaire-Revised (FIQ-R), the Medical Outcomes Study Short Form-36 (SF-36), Brief Pain Inventory (BPI), and the 30-item Profile of Mood States (30-item POMS).

MAIN OUTCOME MEASUREMENTS:

FIQ-R overall impact subscale RESULTS: BMI was significantly correlated with fibromyalgia impact ($p < .001$). The relationship between BMI and fibromyalgia impact was almost fully accounted for by physical factors and not psychological factors.

CONCLUSIONS:

Despite patient report that pain hinders physical activity, clinicians who encounter patients with fibromyalgia, particularly patients with increased BMI, should be cognizant to invest time and resources to counsel patients on physical factors (i.e. physical activity) that could improve the patient's symptom experience.

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KEYWORDS: chronic pain, fibromyalgia, obesity, physical activity PMID: 24534101

Negative input

Pain Med. 2014 Jan 21. doi: 10.1111/pme.12360.

Attentional Bias Toward Negative Information in Patients with Fibromyalgia Syndrome.

Duschek S, Werner NS, Limbert N, Winkelmann A, Montoya P.

Author information

Institute of Applied Psychology, UMIT, University for Health Sciences Medical Informatics and Technology, Hall in Tirol, Austria.

Abstract

OBJECTIVE:

In addition to central nervous sensitization, affect dysregulation constitutes an important factor in the pathogenesis of fibromyalgia syndrome (FMS). The present study is concerned with emotional influences on information processing in FMS. The hypothesis of attentional bias, i.e., selective processing of negatively connoted stimuli, was tested.

METHODS:

Twenty-seven female FMS patients and 34 healthy women undertook an emotional modification of the Stroop task. Subjects had to decide whether the colors of positive, negative, and neutral adjectives accorded with color words presented in black. Attentional bias was defined as delay in color naming of emotional words relative to neutral words. Affective and anxiety disorders, pain severity, as well as medication were considered as possible factors mediating the expected interference.

RESULTS:

Patients showed marked attentional bias, manifested in a greater response delay due to negative words compared with the control group. Among the clinical features, pain severity was most closely associated with the extent of the interference. While depression played only a subordinate role, anxiety and medication were without effect.

CONCLUSIONS:

The study provides evidence of emotionally driven selective attention in FMS. Attentional bias to negative information may play an important role in the vicious circle between negative affective state and pain augmentation. In the management of FMS pain, strategies aiming at conscious direction of attention may be helpful, e.g., imagery techniques or mindfulness training.

Wiley Periodicals, Inc.

KEYWORDS: Chronic Pain, Emotion, Emotional Stroop Test, Fibromyalgia, Selective Attention PMID: 24447855

Pain perception

J Pain Res. 2014 Jan 22;7:81-7. doi: 10.2147/JPR.S49236. eCollection 2014.

Pain-related mood influences pain perception differently in fibromyalgia and multiple sclerosis.

Borg C1, Padovan C2, Thomas-Antérion C3, Chanial C4, Sanchez A5, Godot M6, Peyron R7, De Parisot O8, Laurent B7.

Abstract

In patients, the perception of pain intensity may be influenced by the subjective representation of their disease. Although both multiple sclerosis (MS) and fibromyalgia (FM) possibly include chronic pain, they seem to elicit different disease representations because of the difference in their respective etiology, the former presenting evidence of underlying lesions as opposed to the latter. Thus, we investigated whether patients with FM differed from patients with MS with respect to their perception of "own" pain as well as others' pain. In addition, the psychological concomitant factors associated with chronic pain were considered. Chronic pain patients with FM (n=13) or with MS (n=13) participated in this study. To assess specific pain-related features, they were contrasted with 12 other patients with MS but without chronic pain and 31 controls. A questionnaire describing imaginary painful situations showed that FM patients rated situations applied to themselves as less painful than did the controls.

Additionally, pain intensity attributed to facial expressions was estimated as more intense in FM compared with the other groups of participants. There is good evidence that the mood and catastrophizing reactions expressed in FM differentially modulated the perception of pain according to whether it was their own pain or other's pain.

KEYWORDS: chronic pain, facial expression, imaginary pain, self and other's perspective
PMID: 24489475

NUTRITION/VITAMINS

Diet sodas

Diet Soda Drinkers Eat More Food: Study

Heavy Americans who drink diet beverages rather than those sweetened with sugar appear to eat more, according to a study released on Thursday that raised questions about the role lower-calorie drinks play in helping people lose weight.

Researchers at Johns Hopkins University analyzed data from a U.S. survey of 24,000 people over a period of 10 years. People who were overweight or obese generally consumed the same amount of calories a day no matter what they drank, but those who chose diet drinks got more of those calories from food. Outside experts were quick to caution that it is not clear what role, if any, diet drinks such as low- or no-calorie versions of sodas, sports drinks and teas played for people who ate more. In the study, published in the American Journal of Public Health, overweight drinkers of diet beverages in the United States ate 1,965 in food calories a day compared to 1,874 calories among heavy people who drank regular sugar-sweetened beverages.

Among obese diet beverage drinkers, those who consumed low- or no-calorie drinks ate 2,058 calories a day in food versus 1,897 food calories for those who had regular drinks, researchers said. Such differences were statistically significant, they added. Lead author Sara Bleich said the results, when paired with other research, suggest that artificial sweeteners may affect people's metabolism or cravings, although more study is needed. She acknowledged that people could be deciding to eat more since they are saving calories with their diet drinks. "The push to diet soda may not make a lot of sense if you are then also eating more solid food," Bleich said. "The switch from a sugary beverage to a diet beverage should be coupled with other changes in the diet, particularly reducing snacks." Critics said the analysis, based on data from the National Health and Nutrition Examination survey between 1999 and 2010, is flawed and that it is too early to say what, if any, role the low-calorie drinks or their artificial sweeteners play in weight loss.

Several researchers noted that the study did not track a set group of people over time and only looked at a 24-hour snapshot of what any individual consumed. The beverage industry, which has long promoted diet drinks as an alternative to full-calorie beverages, defended such alternatives to help manage weight. "Losing or maintaining weight comes down to balancing the total calories consumed with those burned through physical activity," the American Beverage Association said in a statement on Thursday.

Low- or no-calories drinks contain artificial sweeteners such as aspartame and sucralose. Many beverage companies are also turning to other alternatives, such as the extract of Stevia. Kelly Brownell, a professor psychology and neuroscience at Duke University and dean of its Sanford School of Public Policy, said while the study was compelling and there are still many questions about such sweeteners, more data is needed. "People need to separate the biology from the psychology," he said.

Bonnie Liebman, the director of nutrition at the Center for Science in the Public Interest, said while her group may have other questions about artificial sweeteners, "it's premature to conclude that it's something going on in your brain."

In the meantime there are other ways to watch your weight, she said: "You're much better off with water - or coffee or tea, if they're unsweetened."

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<http://www.newsmaxhealth.com/Health-News/diet-drinks-food-eat/2014/01/16/id/547543#ixzz2srq6ruPj>

Magnesium

Am J Clin Nutr. 2014 Feb 5.

Magnesium intake, bone mineral density, and fractures: results from the Women's Health Initiative Observational Study.

Orchard TS, Larson JC, Alghothani N, Bout-Tabaku S, Cauley JA, Chen Z, Lacroix AZ, Wactawski-Wende J, Jackson RD.

Abstract

BACKGROUND:

Magnesium is a necessary component of bone, but its relation to osteoporotic fractures is unclear.

OBJECTIVE:

We examined magnesium intake as a risk factor for osteoporotic fractures and altered bone mineral density (BMD).

DESIGN:

This prospective cohort study included 73,684 postmenopausal women enrolled in the Women's Health Initiative Observational Study. Total daily magnesium intake was estimated from baseline food-frequency questionnaires plus supplements. Hip fractures were confirmed by a medical record review; other fractures were identified by self-report. A baseline BMD analysis was performed in 4778 participants.

RESULTS:

Baseline hip BMD was 3% higher ($P < 0.001$), and whole-body BMD was 2% higher ($P < 0.001$), in women who consumed >422.5 compared with <206.5 mg Mg/d. However, the incidence and RR of hip and total fractures did not differ across quintiles of magnesium. In contrast, risk of lower-arm or wrist fractures increased with higher magnesium intake [multivariate-adjusted HRs of 1.15 (95% CI: 1.01, 1.32) and 1.23 (95% CI: 1.07, 1.42) for quintiles 4 and 5, respectively, compared with quintile 1; P -trend = 0.002]. In addition, women with highest magnesium intakes were more physically active and at increased risk of falls [HR for quintile 4: 1.11 (95% CI: 1.06, 1.16); HR for quintile 5: 1.15 (95% CI: 1.10, 1.20); P -trend < 0.001].

CONCLUSIONS:

Lower magnesium intake is associated with lower BMD of the hip and whole body, but this result does not translate into increased risk of fractures. A magnesium consumption slightly greater than the Recommended Dietary Allowance is associated with increased lower-arm and wrist fractures that are possibly related to more physical activity and falls. This trial was registered at clinicaltrials.gov as NCT00000611.

PMID: 24500155

Vitamin D

Int J Clin Pract. 2014 Feb 6. doi: 10.1111/ijcp.12323.

Severe vitamin D deficiency is associated with frequently observed diseases in medical inpatients.

Marra A, Leoncini G, Mussap M, Bovio M, Nazzari E, Giusti M, Minuto F, Murialdo G, Ameri P.

Abstract

INTRODUCTION:

Vitamin D deficiency consequences may go beyond altered calcium homeostasis and musculoskeletal disease. Medical inpatients are often vitamin D-deficient, but little information is available about the relation of vitamin D status with extra-skeletal disorders in this population.

METHODS:

We analysed the relationship between the concentrations of 25-hydroxyvitamin D [25(OH)D], the marker of vitamin D status, and the conditions most commonly causing admission in 115 consecutive medical inpatients.

RESULTS:

Sixty-five subjects (56.5%) had severe vitamin D deficiency [25(OH)D < 8 ng/ml]. Age ($\beta = -0.35$, $p = 0.01$) and hepatic disease ($\beta = -0.21$, $p = 0.02$) were significant correlates of 25(OH)D levels. Compared with patients with ≥ 8 ng/ml 25(OH)D, those with < 8 ng/ml 25(OH)D had significantly higher parathyroid hormone (PTH) concentrations [123 (92.7-208.2) ng/l vs. 88 (68.5-129.5) ng/l, $p < 0.001$], were significantly more likely to have arterial hypertension (OR 2.76, 95% CI 1.16-6.58), heart failure (HF) (OR 2.49, 95% CI 1.14-5.47), cerebrovascular disease (OR 3.23, 95% CI 1.41-7.39), and infections (OR 2.44, 95% CI 1.02-5.87), and stayed in hospital significantly longer (10 days vs. 7.5 days, $p = 0.01$). Only the probability of having an infection remained significantly higher in cases with severe vitamin D deficiency after adjustment for age (OR 2.41, 95% CI 1.03-5.68) and persisted after further correcting for presence of hepatic disease and PTH values (OR 2.66, 95% CI 1.03-6.88). A significant association between PTH and HF (OR 2.32, 95% CI 1.05-5.09) and length of hospitalisation ($\beta = 0.22$, $p = 0.04$) emerged in the fully adjusted regression models.

CONCLUSIONS:

Severe vitamin D deficiency is associated with commonly presenting extra-skeletal diseases in medical inpatients. With the exception of infections, this association is mainly driven by age. Additional studies are needed to determine whether vitamin D testing on admission may help stratifying specific categories of patients by clinical severity.

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Arch Phys Med Rehabil. 2014 Feb 14. pii: S0003-9993(14)00116-6. doi: 10.1016/j.apmr.2014.01.025.