

7. PELVIC ORGANS/WOMAN'S HEALTH

Diastasis Recti reduces strength

ACCEPTED MANUSCRIPT

Comparison of Trunk Muscle Function Between Women With and Without Diastasis Recti Abdominis at 1 Year Postpartum

Nicole F Hills Ryan B Graham Linda McLean

Physical Therapy, pzy083, <https://doi.org/10.1093/ptj/pzy083>

Background

A separation of the abdominal muscles at the linea alba, known as diastasis recti abdominis (DRA), can occur after childbirth. However, the impact of DRA on abdominal muscle function is not clear.

Objective

The objective was to determine if differences exist in trunk muscle function and self-reported pain and low back dysfunction between women with and without DRA at 12 to 14 months postpartum and if differences that emerge from the data are associated with the magnitude of the interrectus distance (IRD).

Design

This study was a prospective observational case-control study.

Methods

Women with (IRD \geq 2.2 cm; n = 18) and without DRA (IRD < 2.2 cm; n = 22) participated. Maximal trunk flexion, extension, and rotation torque-generating capacity (Newton-meters), The Sit Up test (0–3 points), and the Sitting-Rising Test (0–10 points), and trunk flexion, extension, and lateral flexion endurance (seconds) were measured. Pain and disability were assessed using numerical pain rating scales (0–100) and the Roland Morris Low Back Pain Questionnaire (0–24 points). Women were compared using independent *t* tests and Mann-Whitney U-Tests. Pearson's product-moment and Spearman's rank correlation coefficients were used to determine associations; $\alpha = .05$ was used for all tests.

Results

Women with DRA demonstrated significantly lower trunk muscle rotation torque and scored lower on the sit-up test than those without DRA. IRD was negatively correlated with both trunk rotation torque ($\rho = -0.367$) and sit-up test score ($\rho = -0.514$).

Limitations

The results of this study should not be generalized to women who present with moderate-to-severe IRDs or to multiparous women.

Conclusion

The presence of DRA in primiparous women at 1 year postpartum is associated with trunk rotation strength and ability to perform a sit-up.

8. VISCERA

CR CA and diverticulitis – greater risk

Article in Press

Risk of Colorectal Cancer in Patients with Acute Diverticulitis: a Systematic Review and Meta-Analysis of Observational Studies

Jeremy Meyer, MD-PhD Lorenzo A. Orci, MD-PhD Christophe Combescure, PhD ,
Alexandre Balaphas, MD Philippe Morel, MD, PD Nicolas C. Buchs, MD, PD
Frédéric Ris, MD, PD

Structured Abstract

Background & Aims

We performed a systematic review and meta-analysis to assess the prevalence of colorectal cancer in patients with acute diverticulitis.

Methods

We searched MEDLINE from inception through November 2nd, 2017 for studies reporting the prevalence of colorectal cancer in patients with diverticulitis, identified based on the protocol CRD42017083272. This systematic review was conducted in accordance to the MOOSE guidelines. Pooled prevalence values were obtained by random effects models and robustness was tested by leave-one out sensitivity analyses. Heterogeneity was assessed using the Q-test and quantified based on I² value. The critical appraisal of included studies was performed using the Newcastle-Ottawa scale.

Results

Our final analysis included 31 studies, comprising 50'445 patients. The pooled prevalence of colorectal cancer was 1.9% (95% CI, 1.5%–2.3%). Patients with complicated diverticulitis had a significantly higher risk for colorectal cancer (prevalence, 7.9%; 95% CI, 3.9%–15.3%) than patients with uncomplicated diverticulitis (prevalence, 1.3%; 95% CI, 0.1%–2%), corresponding to a pooled prevalence ratio of 6.7 (95% CI, 2.5–18.3). Subgroup analyses did not find significant difference in prevalence when separately pooling studies according to ranking on the Newcastle-Ottawa scale, geographical location or length of follow-up. Meta-regression did not find any association between age and colorectal cancer. Among patients who underwent endoscopy, the pooled prevalence of polyps was 22.7% (95% CI, 19.6%–26.0%), of advanced adenomas was 4.4% (95% CI, 3.4%–5.8%), of adenomas was 14.2% (95% CI, 11.7%–17.1%), and of hyperplastic polyps was 9.2% (95% CI, 7.6%–11.2%).

Conclusion

In a meta-analysis of observational studies of patients with acute diverticulitis, we found the pooled prevalence of colorectal cancer to be 1.9%. The risk of colorectal cancer was significantly higher in patients with complicated diverticulitis than in patients with uncomplicated diverticulitis.

10 A. CERVICAL SPINE

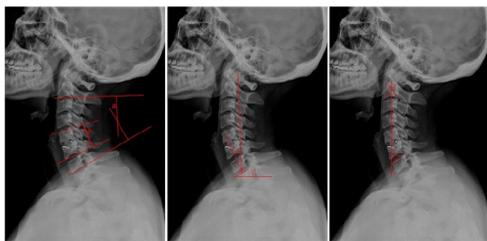
Posture

Cervical sagittal alignment as a predictor of adjacent-level ossification development

Authors Liu W, Rong Y, Chen J, Luo Y, Tang P, Zhou Z, Fan J, Cai W

Published 20 July 2018 Volume 2018:11 Pages 1359—1366

DOI <https://doi.org/10.2147/JPR.S160472>



Purpose: To explore the role of cervical sagittal alignment in the occurrence of adjacent-level ossification development (ALOD) in patients who underwent anterior cervical discectomy fusion with self-locking stand-alone polyetheretherketone cage, and the relationship between cervical sagittal alignment and clinical outcomes.

Background: Because of its advantages, anterior cervical plating systems have been used as the classic surgical method in the treatment of patients with cervical disc herniation. However, the proximity (<5 mm) of the plate to the adjacent disc space has proven to be a critical risk factor for ALOD. How cervical sagittal alignment influences the development of ALOD is unknown and its role in ALOD needs clarification.

Patients and methods: One hundred and eighteen adults who underwent anterior cervical discectomy fusion with self-locking stand-alone polyetheretherketone cage for cervical radiculopathy or myelopathy between December 2013 and December 2015 were retrospectively recruited. Of these, 15 patients developed ALOD and 103 patients did not, representing two groups for comparison. The cervical sagittal parameters were measured, including C2–C7 Cobb angle (Cobb), fused segment angle, cervical tilt (CT), T1 slope (T1S) and C2–C7 sagittal vertical axis. Clinical outcomes and efficacy were evaluated using a visual analog scale, Japanese Orthopedic Association (JOA) score and neck disability index (NDI) score before and after surgery.

Results: There were no significant differences in patient demographics between the two groups. Cobb value ($P<0.05$), CT ($P<0.05$) and T1S ($P<0.05$) were significantly different between the two groups, while fused segment angle ($P>0.05$) and C2–C7 sagittal vertical axis ($P>0.05$) showed no difference. Compared with preoperative scores, improvement was seen in postoperative visual analog scale, JOA and NDI scores at each time point ($P<0.05$). However, the postoperative scores at 24 months in the NO-ALOD group indicated greater improvements compared with the ALOD group ($P<0.05$). There were significant correlations between Cobb and CT ($r=0.607$, $P<0.05$) and CT and T1S ($r=0.681$, $P<0.05$). Also, T1S was significantly correlated with clinical outcomes (JOA: $r=0.689$, $P<0.05$; NDI: $r=-0.710$, $P<0.05$).

Conclusion: Maintaining a lordotic cervical sagittal alignment was related to a lower risk of ALOD and improved clinical outcomes.

Muscle morphology in cervical degeneration**Relationship between cervical muscle morphology evaluated by MRI, cervical muscle strength and functional outcomes in patients with degenerative cervical myelopathy**

, Nikola Wilk, Octavian Dobrescu, Philippe Martel, Carlo Santaguida, Michael H. Weber

DOI: <https://doi.org/10.1016/j.msksp.2018.07.003>

Highlights

- Cervical muscle lean mass is positively associated with muscle strength in DCM.
- Greater cervical muscle fatty infiltration is associated with lower mJOA score.
- Clinicians should pay greater attention to cervical muscles in patients with DCM.

Background

Cervical muscle alterations have been reported in patients with chronic neck pain, but the assessment of muscle morphology and strength has been overlooked in patients with degenerative cervical myelopathy (DCM).

Objectives

This study aimed to investigate the relationship between cervical muscle degenerative changes observed on MRI, muscle strength and symptoms severity in patients diagnosed with DCM.

Design

Observational study.

Methods

Cervical muscle measurements of total cross-sectional area (CSA), functional CSA (fat free area, FCSA) and ratio of FCSA/CSA (e.g. fatty infiltration) were obtained from T2-weighted axial MR images from C2-C3 to C6-C7 in 20 patients. Muscle strength was assessed manually using a microFET2 dynamometer. The association between cervical muscle morphology parameters, muscle strength, symptoms severity and functional status was investigated.

Results

Greater mean CSA and FCSA was associated with greater overall muscle strength. The mean FCSA explained 37%, 76%, 39%, 20% and 65% of the total variance in flexion, extension, right-side bending, left-side bending and overall muscle strength, respectively. The mean ratio of FCSA/CSA was not significantly associated with cervical muscle strength in any direction. However, greater FCSA/CSA ratio (e.g. less fatty infiltration) was associated with lower disability score ($p = 0.02$, $R^2 = 0.20$).

Conclusions

Cervical muscle lean muscle mass was positively associated with cervical muscle strength in patients with DCM. Moreover, greater fatty infiltration in the cervical extensor muscles was associated with lower functional score. Such findings suggest that clinicians should pay greater attention to cervical muscle morphology and function in patients with DCM.

13 C. AIRWAYS/SWALLOWING/SPEECH**Sleep and IBS**

Dig Dis Sci. 2018 Jul 19. doi: 10.1007/s10620-018-5207-0

Sleep Disturbances Can Be Prospectively Observed in Patients with an Inactive Inflammatory Bowel Disease.

Bar-Gil Shitrit A^{1,2}, Chen-Shuali C^{3,4}, Adar T^{5,4}, Koslowsky B^{5,4}, Shteingart S^{5,4}, Paz K^{5,4}, Grisaru-Granovsky S^{6,4}, Goldin E^{5,4}, Epstein Shochet G^{7,8}, Shitrit D^{7,8}.

BACKGROUND:

Poor sleep quality is associated with adverse health consequences. Sleep disturbances can impact the immune function and inflammatory processes. Little is known about sleep disturbances in patients with inflammatory bowel disease (IBD), while not in flare, i.e., inactive.

AIMS:

To prospectively explore the sleep quality of patients with an inactive IBD.

METHODS:

This pilot study included 36 consecutive patients with IBD and 27 healthy volunteers. All IBD patients had an inactive disease. Participants underwent an overnight ambulatory polysomnography. Data on disease duration, medications, complications, and treatment were collected from the medical records.

RESULTS:

The mean age of the IBD and the control groups was 39 ± 15 and 34.6 ± 9.6 years. A significantly less rapid eye movement (REM) sleep was noted in the IBD group vs. control (23.7 vs. 27.8%, $p = 0.047$); light sleep percentage and REM latency were also longer in the IBD group. Moreover, oxygen desaturation below 90% was more common in the IBD group. All other sleep parameters including respiratory disturbance index, apnea-hypopnea index, number of wakes, sleep latency, and snoring strength were similar in both groups.

CONCLUSIONS:

Inactive IBD is associated with sleep disturbances. A larger prospective study should be conducted to confirm these findings.

OSA and activity level

Sleep Breath. 2018 Jul 18. doi: 10.1007/s11325-018-1700-0.

Obstructive sleep apnea negatively impacts objectively measured physical activity.

Hargens TA¹, Martin RA², Strosnider CL², Giersch GEW², Womack CJ².

PURPOSE:

Obesity and obstructive sleep apnea (OSA) are frequent comorbid conditions. The impact of OSA on objectively measured physical activity (PA), independent of obesity, is not clear. The purpose of this study is to examine the effect of OSA on PA measured via accelerometer.

METHODS:

Overweight-to-obese individuals were recruited and screened for the presence of OSA via portable diagnostic device and divided into an OSA (n = 35) and control group (n = 24). Daytime sleepiness was assessed with the Epworth Sleepiness Scale. Body composition was assessed with dual-energy X-ray absorptiometry. Subjects wore an accelerometer (Actigraph GT3X+, Actigraph Corp., Pensacola, FL) for a minimum of 4 and maximum of 7 days, including at least one weekend day.

RESULTS:

There were no group differences in body mass index (BMI) or daytime sleepiness. Waist and neck circumference were higher in the OSA group. The OSA group was significantly older than the control group. The OSA group had fewer steps, moderate intensity minutes, moderate-to-vigorous minutes, number of PA bouts per day (\geq moderate intensity PA for ≥ 10 consecutive minutes), and total number of PA bouts. When adjusted for age, the PA bout data was no longer significant.

CONCLUSION:

Individuals screened as likely possessing OSA were less physically active than individuals without OSA when measured through objective means. We found no group differences in daytime sleepiness, BMI, or percent fat, suggesting other mechanisms than obesity and sleepiness for this difference.

Migraines and sleep

The Journal of Headache and Pain December 2018, 19:58|

Poor sleep quality in migraine and probable migraine: a population study

- Tae-Jin Song Soo-Jin Cho Won-Joo Kim Kwang Ik Yang Chang-Ho Yun Min Kyung Chu

Background

Probable migraine (PM) is a subtype of migraine that is prevalent in the general population. Previous studies have shown that poor sleep quality is common among migraineurs and is associated with an exacerbation of migraine symptoms. However, information on the prevalence and clinical implication of poor sleep quality among individuals with PM is scarce. Thus, the aim of this study was to assess the prevalence and clinical impact of poor sleep quality in individuals with PM in comparison with those with migraine.

Methods

Two-stage cluster random sampling was used to perform the survey for sleep and headache in Korean general population. Participants with Pittsburgh Sleep Quality Index > 5 were considered as having poor sleep quality.

Results

Of 2695 participants, 379 (14.1%) had PM and 715 (26.5%) had poor sleep quality. Prevalence of poor sleep quality was 35.4% in the PM group, which was lower than that in the migraine group (47.6%, $p = 0.011$), but higher than that in the non-headache group (21.4%, $p < 0.001$). The PM participants with poor sleep quality showed increased headache frequency (median [interquartile range]: 2.0 [0.3–4.0] vs. 1.0 [0.2–2.0]; $p = 0.001$) and headache intensity (visual analogue scale, 6.0 [4.0–7.0] vs. 5.0 [3.5–6.0]; $p = 0.003$) compared to PM participants who had no poor sleep quality.

Conclusions

Poor sleep quality was prevalent among participants with PM. It was associated with an exacerbation of PM symptoms. Our findings suggest that proper evaluation and treatment for poor sleep quality are needed in the management of PM.

14. HEADACHES

Sleep and migraines

The Journal of Headache and Pain December 2018, 19:58|

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- Tae-Jin Song Soo-Jin Cho Won-Joo Kim Kwang Ik Yang Chang-Ho Yun Min Kyung Chu

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Conclusions

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Depression and migraines

J Headache Pain. 2018 Jul 17;19(1):56. doi: 10.1186/s10194-018-0884-9.

Migraine and greater pain symptoms at 10-year follow-up among patients with major depressive disorder.

Hung CI¹, Liu CY¹, Yang CH², Wang SJ^{3,4}.

BACKGROUND:

No study has investigated the associations of migraine with pain symptoms over a ten-year period among outpatients with major depressive disorder (MDD). This study aimed to investigate this issue.

METHODS:

At baseline, the study enrolled 290 outpatients with MDD and followed-up the patients at six-month, two-year, and ten-year time points. MDD and anxiety comorbidities were diagnosed using the Structured Clinical Interview for DSM-IV-text revision. Migraine was diagnosed based on the International Classification of Headache Disorders. The bodily pain subscale of the Short Form 36 (SF-BP) and the pain subscale (PS) of the Depression and Somatic Symptoms scale were also used. Generalized Estimating Equation models were employed to investigate the longitudinal impacts of migraine on pain symptoms.

RESULTS:

MDD patients with migraine had lower SF-BP and higher PS scores than those without. Depression, anxiety, and headache indices were significantly correlated with SF-BP and PS scores. The higher the frequency of migraine, the more often patients suffered from pain symptoms. Patients with migraine at all investigated time points suffered from pain symptoms most of the time (ranging from 60.0% to 73.7%) over the 10 years. After controlling for depression and anxiety, migraine was independently associated with a decreased SF-BP score (by 8.93 points) and an increased PS score (by 1.33 points).

CONCLUSION:

Migraine was an important comorbidity associated with greater severities of pain symptoms during long-term follow-up. Migraine treatment should be integrated into the treatment of depression to improve pain symptoms and quality of life in the pain dimension.

Tinnitus and migraines

JAMA Otolaryngol Head Neck Surg. 2018 Jul 12. doi: 10.1001/jamaoto.2018.0939.

Association of Tinnitus and Other Cochlear Disorders With a History of Migraines.

Hwang JH^{1,2}, Tsai SJ³, Liu TC⁴, Chen YC^{2,5}, Lai JT⁶.

IMPORTANCE:

A headache is a symptom of a migraine, but not all patients with migraine have headaches. It is still unclear whether a migraine might increase the risk of cochlear disorders, even though a migraine does not occur concurrently with cochlear disorders.

OBJECTIVE:

To investigate the risk of cochlear disorders for patients with a history of migraines.

DESIGN, SETTING, AND PARTICIPANTS:

This study used claims data from the Taiwan Longitudinal Health Insurance Database 2005 to identify 1056 patients with migraines diagnosed between January 1, 1996, and December 31, 2012. A total of 4224 controls were also identified from the same database based on propensity score matching. Statistical analysis was performed from January 23, 1996, to December 28, 2012.

MAIN OUTCOMES AND MEASURES:

The incidence rate of cochlear disorders (tinnitus, sensorineural hearing impairment, and/or sudden deafness) was compared between the cohorts by use of the Kaplan-Meier method. The Cox proportional hazards regression model was also used to examine the association of cochlear disorders with migraines.

RESULTS:

Of the 1056 patients with migraines, 672 were women and 384 were men, and the mean (SD) age was 36.7 (15.3) years. Compared with the nonmigraine cohort, the crude hazard ratio for cochlear disorders in the migraine cohort was 2.83 (95% CI, 2.01-3.99), and the adjusted hazard ratio was 2.71 (95% CI, 1.86-3.93). The incidence rates of cochlear disorders were 81.4 (95% CI, 81.1-81.8) per 1 million person-years for the migraine cohort and 29.4 (95% CI, 29.2-29.7) per 1 million person-years for the nonmigraine cohort. The cumulative incidence of cochlear disorders in the migraine cohort (12.2%) was significantly higher than that in the matched nonmigraine cohort (5.5%). Subgroup analysis showed that, compared with the nonmigraine cohort, the adjusted hazard ratios in the migraine cohort were 3.30 (95% CI, 2.17-5.00) for tinnitus, 1.03 (95% CI, 0.17-6.41) for sensorineural hearing impairment, and 1.22 (95% CI, 0.53-2.83) for sudden deafness.

CONCLUSIONS AND RELEVANCE:

In this population-based study, the risk of cochlear disorders, especially for tinnitus, was found to be significantly higher among patients with a history of migraines. This finding may support the presence and/or concept of "cochlear migraine."

Glutamate levels in migraineurs

J Headache Pain. 2018 Jul 17;19(1):55. doi: 10.1186/s10194-018-0885-8.

Increased thalamic glutamate/glutamine levels in migraineurs.

Bathel A^{1,2}, Schweizer L¹, Stude P¹, Glaubitz B¹, Wulms N³, Delice S¹, Schmidt-Wilcke T^{4,5}.

BACKGROUND:

Increased cortical excitability has been hypothesized to play a critical role in various neurological disorders, such as restless legs syndrome, epilepsy and migraine. Particularly for migraine, local hyperexcitability has been reported. Levels of regional excitatory and inhibitory neurotransmitters are related to cortical excitability and hence may play a role in the origin of the disease.

Consequently, a mismatch of the excitatory-inhibitory neurotransmitter network might contribute to local hyperexcitability and the onset of migraine attacks. In this study we sought to assess local levels of glutamate / glutamine (GLX) and gamma-aminobutyric acid (GABA) in the occipital cortex and right thalamus of migraineurs and healthy subjects.

METHODS:

We measured interictally local biochemical concentrations in the occipital lobe and the right thalamus in patients with migraine (without aura) and healthy controls (HCs) using proton magnetic resonance spectroscopy at 3 T. GLX levels were acquired using PRESS and GABA levels using the GABA-sensitive editing sequence MEGA-PRESS. Regional GLX and GABA levels were compared between groups.

RESULTS:

Statistical analyses revealed significantly increased GLX levels in both the primary occipital cortex and thalamus. However, we found no group differences in GABA levels for these two regions. Correlation analyses within the migraine group revealed no significant correlations between pain intensity and levels of GLX or GABA in either of the two brain regions.

CONCLUSIONS:

Further research is needed to investigate the role of GABA/GLX ratios in greater depth and to measure changes in neurotransmitter levels over time, i.e. during migraine attacks and interictally.

15. VESTIBULAR**Changes in cervical function**

J Orthop Sports Phys Ther. 2018 Jul 27:1-29. doi: 10.2519/jospt.2018.8258.

Changes in Measures of Cervical Spine, Vestibulo-ocular Reflex, Dynamic Balance and Divided Attention Following Sport-Related Concussion in Elite Youth Ice Hockey Players.

Schneider KJ^{1,2}, Meeuwisse WH¹, Palacios-Derflingher L^{1,3}, Emery CA^{1,3}.

Background Concussion is a commonly occurring injury. The extent to which the cervical spine, vestibulo-ocular reflex (VOR), dynamic balance and divided attention are affected following concussion is not well understood.

Objective To evaluate acute changes in measures of 1) cervical spine, 2) VOR function, 3) dynamic balance and 4) tasks of divided attention in elite youth ice hockey players following a sport-related concussion.

Methods Elite 13-17 year old ice hockey players completed cervical spine measures [cervical flexor endurance test (CFE), head perturbation test, anterolateral strength, cervical flexion rotation test, joint position error], VOR [head thrust test, dynamic visual acuity (DVA) (clinical and computerized)], dynamic balance [Functional Gait Assessment (FGA)] and divided attention [Walking While Talking (WWT) test] preseason and following concussion.

Results At least one test was completed by 69/97 (71%) players (a maximum of 55 for any one test) at both preseason and acutely post concussion (median 4 days post concussion). After Bonferroni corrections ($\alpha=0.00625$), using Wilcoxon Signed-Rank Test, cervical spine measures were significantly worse following concussion compared to baseline [CFE ($z=-5.20$, $p<0.00001$), anterolateral neck strength ($z_{\text{left}}=-5.36$, $p<0.0001$; $z_{\text{right}}=-5.45$, $p<0.0001$) and head perturbation test ($z=-4.63$, $p<0.001$)]. Time taken to complete a complex task of divided attention relative to normal walking speed was faster (improved) compared to preseason ($z=-2.59$, $p=0.0096$). There was no change in VOR or dynamic balance following concussion.

Conclusions Measures of cervical spine function and divided attention were altered following concussion. However, tests of VOR and dynamic balance were not significantly different than baseline. Future research to evaluate the mechanism underlying these changes is warranted. J Orthop Sports Phys Ther, Epub 27 Jul 2018. doi:10.2519/jospt.2018.8258.

32 A. KNEE/ACL**Running mechanics**

J Orthop Sports Phys Ther. 2018 Jul 22:1-26. doi: 10.2519/jospt.2018.8170.

Bilateral Alterations in Running Mechanics and Quadriceps Function Following Unilateral Anterior Cruciate Ligament Reconstruction.

Pamukoff DN¹, Montgomery MM¹, Choe KH², Moffit TJ¹, Garcia SA¹, Vakula MN³.

Study Design Controlled laboratory study; cross-sectional.

Background Individuals who have undergone anterior cruciate ligament reconstruction (ACLR) have quadriceps muscle impairments that influence gait mechanics and may contribute to an elevated risk of knee osteoarthritis.

Objective To compare running mechanics and quadriceps function between individuals who have undergone ACLR to a control group, and evaluate the association between quadriceps function and running mechanics.

Methods Thirty-eight individuals who previously underwent primary unilateral ACLR (mean \pm standard deviation time since reconstruction, 48.0 \pm 25.0 months) were matched to 38 control participants based on age, sex, and body mass index, and underwent assessments of quadriceps muscle performance and running biomechanics. Quadriceps muscle performance was assessed via isokinetic and isometric knee extension peak torque (PT) and rate of torque development over 2 time frames: 0-100 ms (RTD100) and 0-200 ms (RTD200). Running evaluation included assessment of the knee flexion angle (KFA), knee extension moment (KEM), rate of KEM (RKEM), vertical instantaneous loading rate (VILR), and vertical impact peak (VIP).

Results On average, there was a smaller KFA ($P=.016$) in the involved limb compared to uninvolved limb in the ACLR group. Compared to control group limbs, involved limbs in the ACLR group had lower RTD100 ($P=.015$), lower PT at 60° \cdot sec⁻¹ ($P=.011$), lower PT at 180° \cdot sec⁻¹ ($P=.017$), smaller KFA ($P<.001$), lower KEM ($P=.001$), lower RKEM ($P=.004$), and higher VILR ($P=.015$). Compared to control group limbs, uninvolved limbs in the ACLR group had lower RTD100 ($P=.002$), lower PT at 60° \cdot sec⁻¹ ($P=.011$), and smaller KFA ($P=.01$). For the involved limbs in the ACLR group, there was a low correlation between isokinetic PT at 180° \cdot sec⁻¹ and RKEM ($r=0.38$, $P=.01$), and between RTD100 and RKEM ($r=0.26$, $P=.05$). No differences were found in isometric strength for any comparison.

Conclusions Individuals who have undergone ACLR have bilateral alterations in running mechanics that are weakly associated with diminished quadriceps muscle performance. J Orthop Sports Phys Ther, Epub 22 Jul 2018. doi:10.2519/jospt.2018.8170.

Gait post ACL

J Orthop Sports Phys Ther. 2018 Jul 27;1-21. doi: 10.2519/jospt.2018.8084.

Psychological Readiness to Return to Sport Is Associated With Knee Kinematic Asymmetry During Gait Following ACL Reconstruction.

Zarzycki R¹, Failla M², Capin J¹, Snyder-Mackler L^{1,3}.

Study Design Controlled laboratory study; cross sectional.

Background Gait asymmetry frequently is observed following anterior cruciate ligament reconstruction (ACLR). Psychological readiness to return to sport is associated with functional and activity related outcomes after ACLR. However, the association between gait asymmetry and psychological readiness to return to sport is unknown.

Objectives To determine the relationship between kinematic and kinetic measures of knee symmetry during gait and psychological readiness to return to sport following ACLR.

Methods Seventy-nine athletes (39 women) underwent gait analysis following impairment resolution following ACLR (i.e. full range of motion, minimal or no effusion, quadriceps strength index $\geq 80\%$). Interlimb differences during gait were calculated for sagittal plane knee angles at initial contact (IC), peak knee flexion (PKF), and peak knee extension; and peak knee flexion moment (PKFM) and peak knee adduction moment (PKAM). Athletes completed the Anterior Cruciate Ligament-Return to Sport after Injury Scale (ACL-RSI) to assess psychological readiness to return to sport. Pearson correlations were used to examine the association between ACL-RSI and each gait symmetry variable.

Results Significant negative correlations were observed between the ACL-RSI and two kinematic variables: knee flexion angle at IC ($r=-.281$, $p=.012$) and PKF ($r=-.248$, $p=.027$). In general, lower scores on the ACL-RSI were associated with greater interlimb asymmetry.

Conclusion There was a weak association between psychological readiness to return to sport and knee kinematic symmetry during gait. Level of Evidence Level III; secondary analysis of prospectively collected data. J Orthop Sports Phys Ther, Epub 27 Jul 2018. doi:10.2519/jospt.2018.8084.

44. RHUMATOID ARTHRITIS

Inflammatory disease

Full Length Article

A comparative analysis of articular bone in large cohort of patients with chronic inflammatory diseases of the joints, the gut and the skin

David Simon^a Arnd Kleyer^a Matthias Englbrecht^a Fabian Stemmler^a Christoph Simon^a Andreas Berlin^a Roland Kocijan^b Judith Haschka^b Simon Hirschmann^c Raja Atreya^c Markus F. Neurath^c Michael Sticherling^d Juergen Rech^a Axel J. Hueber^a Klaus Engelke^c Georg Schett^a
<https://doi.org/10.1016/j.bone.2018.07.017> Get rights and content

Highlights

- Volumetric bone density of the hand joints was determined in a large cohort of patients with inflammatory diseases
- High-resolution computed tomography was applied to measure bone mass at pre-defined strictly intra-articular sites
- Among all the inflammatory disease ACPA-positive RA is the most potent precipitator for articular bone loss

Abstract

Chronic inflammatory diseases are associated with bone loss. While the occurrence of systemic bone loss is well described in chronic inflammatory diseases, the impact of these conditions on articular bone has not been systematically investigated. Recent refinements in high-resolution CT assessment of the joints now allow the accurate measure of articular bone composition. In this study 476 subjects comprising healthy individuals and patients with anticitrullinated protein antibody (ACPA)-positive rheumatoid arthritis (RA), ACPA-negative RA, Crohn's disease (CD), ulcerative colitis (UC), psoriasis (PsO) and psoriatic arthritis (PsA) were subjected to high-resolution quantitative computed tomography (HR-pQCT) of the hand. Metacarpal heads were assessed for total, trabecular and cortical volumetric bone mineral density (vBMD). Only ACPA+RA, but not the remaining inflammatory diseases (ACPA-RA, CD, UC, PsO, PsA) showed significant ($p < 0.001$) loss of articular bone affecting both the trabecular and the cortical compartments. Age and body mass index were also associated with articular bone changes, the former with lower, the latter with higher articular bone mass. In multivariate models, presence of ACPA+RA was an independent factor for articular bone loss. Among chronic inflammatory diseases ACPA+RA is the most potent precipitator for articular bone loss pointing out the role of autoimmunity in the development of articular bone disease in the context of chronic inflammatory disease.

54. POSTURE**Postural ratios and anxiety**

Menopause. 2018 Aug;25(8):904-911. doi: 10.1097/GME.0000000000001089.

Association between waist-to-height ratio and anxiety in middle-aged women: a secondary analysis of a cross-sectional multicenter Latin American study.

Arroyo KJ¹, Ramos-Torres G¹, Mezones-Holguin E^{1,2,3}, Blümel JE^{3,4}, Barón G³, Bencosme A³, Benítez Z³, Bravo LM³, Calle A³, Flores D³, Espinoza MT³, Gómez G³, Hernández-Bueno JA³, Martino M³, Lima S³, Monterrosa A³, Mostajo D³, Ojeda E³, Onatra W³, Sánchez H³, Tserotas K³, Vallejo MS³, Witis S³, Zúñiga MC³, Chedraui P^{3,5}.

OBJECTIVE:

The aim of the study was to evaluate the association between waist-to-height ratio (WHtR) and anxiety in middle-aged women.

METHODS:

We carried out a secondary analysis of data from a multicenter study of women between 40 and 59 years old from 11 Latin America countries. Anxiety was assessed using the Goldberg Anxiety and Depression Scale. WHtR was calculated according to World Health Organization standards and categorized in tertiles: upper, middle, and lower using 0.45 and 0.6 as cutoff values. Prevalence ratios (PRs) and 95% CIs were calculated by generalized linear models of Poisson family with robust standard errors, both crude and adjusted models based on statistical and epidemiological criteria.

RESULTS:

Data of a total of 5,580 women were analyzed. Mean age was 49.7±5.5 years, and 57.9% were postmenopausal. The 61.3% of women had anxiety and mean WHtR was 0.54±0.1. In the crude model, compared with women in lower tertile, those in the middle (PR: 1.07; 95% CI, 1.01-1.13) and upper (PR: 1.23 95% CI, 1.07-1.29) WHtR tertile were significantly more likely to have anxiety. In the adjusted models, only women in upper tertile were, however, more likely of displaying anxiety than those in lower tertile (PR: 1.13; 95% CI, 1.08-1.18).

CONCLUSIONS:

In this series, WHtR was associated with anxiety in middle-aged women. It is advisable to further study this anthropometric measure in order for it to be incorporated in the routine clinical practice and evaluation of middle-aged women.

56. ATHLETICS**Impact of smoking on injury**

ACCEPTED MANUSCRIPT

The Combined Effect of Cigarette Smoking and Fitness on Injury Risk in Men and Women

Raina D Brooks, MPH Tyson Grier, MS Esther O Dada, MPH Bruce H Jones, MD, MPH

Nicotine & Tobacco Research, nty155, <https://doi.org/10.1093/ntr/nty155>**Background**

Prior studies have identified cigarette smoking and low fitness as independent risk factors for injury; however, no studies have evaluated the combined effect of cigarette smoking and fitness on injury risk.

Objective

To evaluate the combined effect of cigarette smoking and fitness on injury risk in men and women.

Design

This is a secondary analysis of data collected from U.S. Army recruits (n=2000) during basic combat training (BCT) within the United States in 2007. Physical training and fitness, cigarette smoking and prior injury were obtained from questionnaires, while demographic and injury data were obtained from medical and BCT unit records. Chi-squared tests were used to assess differences in injury risk by fitness level and cigarette smoking. Relative Risk (RR) were calculated with 95% confidence intervals

Results

The primary findings showed that smokers experienced 20-30% higher risk of injury than non-smokers. In addition, higher aerobic and muscular fitness were generally not protective against injury between least fit and more fit smokers. However, higher fitness was protective against injury between least and more fit non-smokers, with least fit non-smokers being 30-50% more likely to experience an injury than fit non-smokers.

Conclusion

This study revealed that higher aerobic and muscular fitness was not protective against injury among smokers; however, it was protective against injury among non-smokers. Further implementation of smoking cessation programs may be beneficial for military and civilian personnel who are required to be physically fit in order to carry out their job responsibilities.

Implications/Highlights

Male and female smokers experienced significantly higher risk of injury than non-smokers.

While higher fitness is protective against injury in non-smokers, the protective effect of fitness is lost among smokers.

In an attempt to reduce injury risk among military and emergency personnel, smoking cessation programs should be further implemented among both more fit and less fit smokers.

58. RUNNING**Self-reported running**

J Orthop Sports Phys Ther. 2018 Jun 22:1-23. doi: 10.2519/jospt.2018.8169.

How Do Novice Runners With Different Body Mass Index Commence a Self-Chosen Running Regime?

Bertelsen ML¹, Hansen M¹, Rasmussen S^{2,3}, Nielsen RO¹.

Study Design An explorative 7-day prospective cohort study.

Background Overweight and obese novice runners are subjected to a higher load per stride than their normal-weight peers. Yet, do they reduce their running dose accordingly when commencing a self-chosen running regime?

Objectives To describe and compare the preferred running dose in normal-weight (NWR), overweight (OWR) and obese novice runners (OBR) when they commence a self-chosen running regime.

Methods 914 novice runners were categorized into one of 3 exposure groups based on their body mass index (BMI): (i) NWR (BMI < 25, n=405, reference group); (ii) OWR (BMI 25 to < 30, n=341); and (iii) OBR (BMI ≥ 30, n=168). All runners were equipped with a GPS running watch which provided information about distance, duration, speed, and date of each running session during the first week of a self-chosen running regime.

Results During the first session, OWR (difference: -0.5 km/h; 95%CI:-0.8,-0.2; p<0.05) and OBR (-1.7 km/h; 95%CI:-2.0,-1.4; p<0.05) ran slower than NWR. OBR also ran less distance than NWR (-0.4 km, 95%CI:-0.7;-0.2, p<0.05). During the first week, OWR (-0.5 km/h; 95%CI:-0.7,-0.2, p<0.05) and OBR (-1.7 km/h; 95%CI:-2.0,-1.4; p<0.05) ran slower than NWR, while running distance and duration were similar.

Conclusion OWR and OBR chose a similar training dose as NWR when commencing a self-chosen running regime. This may partly explain the higher running-injury risk among OWR and OBR compared with NWR observed by other studies. J Orthop Sports Phys Ther, Epub 22 Jun 2018. doi:10.2519/jospt.2018.8169

Stiffness and running

J Orthop Sports Phys Ther. 2018 Jul 27:1-24. doi: 10.2519/jospt.2019.7683.

Clinical Predictors of Dynamic Lower Extremity Stiffness During Running.

Goodwin JS¹, Blackburn JT², Schwartz TA³, Williams DSB 3rd⁴.

Study Design Cross-sectional controlled laboratory study.

Background Lower extremity stiffness describes the relative loading and kinematics of the entire lower extremity during ground contact. Previously injured subjects demonstrate altered lower extremity stiffness values. Clinical analysis of lower extremity stiffness is not currently feasible due to increased time and cost.

Objective To determine the clinical identifiable contributors to lower extremity stiffness.

Methods Ninety-two healthy runners completed a clinical screening involving passive assessment of hip, knee, and ankle range of motion along with body anthropometrics. The range of motion was predominately assessed in the sagittal and frontal planes. In the same session runners completed an overground kinematic and kinetic running assessment at 3.35 m/s ($\pm 5\%$) to obtain lower extremity stiffness. Correlations between lower extremity stiffness and clinical variables were completed. Modifiable variables were included in an all possible linear regressions approach to determine a parsimonious model for predicting lower extremity stiffness.

Results Clinically modifiable measures included in the regression model accounted for 48.4% of the variance of lower extremity stiffness during running. The variables that predicted greater stiffness included: greater body mass, less ankle dorsiflexion range of motion with the knee flexed, less hip internal rotation range of motion and less first ray mobility.

Conclusion Reduced lower extremity range of motion and greater body mass are associated with greater lower extremity stiffness during running. These variables could be addressed clinically to potentially alter lower extremity stiffness and injury risk. J Orthop Sports Phys Ther, Epub 27 Jul 2018. doi:10.2519/jospt.2019.7683.

59. PAIN

Pain pictorial scale

ORIGINAL RESEARCH

Development of a pictorial scale for assessing functional interference with chronic pain: the Pictorial Pain Interference Questionnaire

Authors Cook AJ, Roberts DA, Nelson KC, Clark BR, Parker BE Jr

Published 19 July 2018 Volume 2018:11 Pages 1343—1354

DOI <https://doi.org/10.2147/JPR.S160801>

Background: Assessment of function and functional interference is an important component of chronic pain assessment and treatment and is commonly based on self-report questionnaires. Existing questionnaires for assessing functional interference are language dependent, which can limit their utility for patients across cultures with literacy, fluency, or cognitive restrictions.

Objective: The objectives of this study were to create a tool with minimal language dependence and literacy requirement for measuring functional interference due to chronic pain and evaluate the psychometric properties and usability of this new assessment scale, the Pictorial Pain Interference Questionnaire (PPIQ), in a clinical sample of participants with chronic pain.

Design: The study employed a prospective, cross-sectional design in a clinical chronic pain setting.

Participants and methods: A total of 113 participants with chronic non-cancer pain were recruited from a private chronic pain clinic. A pictorial scale was developed and tested via psychometric procedures, including comparisons with validated measures of functional interference and related chronic pain constructs.

Results: Excellent internal consistency reliability ($\alpha=0.91$), good construct validity (total score: $r=0.72-0.81$), and adequate-to-good convergent and discriminant validities were demonstrated through comparative analyses with existing self-report questionnaires. A scoring metric for classifying low, moderate, and high levels of interference was found to have good construct validity. Evaluation of satisfaction revealed adequate understanding of the PPIQ among most users.

Conclusion: Initial support for the PPIQ as an alternative to language-based questionnaires for assessing functional interference from chronic pain was found. Subsequent research will help to clarify psychometric properties of the PPIQ and user response among various chronic pain subgroups.

61. FIBROMYALGIA

ADHD

ORIGINAL RESEARCH

Attention-deficit hyperactivity disorder and impulsivity in female patients with fibromyalgia

Authors Yilmaz E, Tamam L

Published 24 July 2018 Volume 2018:14 Pages 1883—1889

DOI <https://doi.org/10.2147/NDT.S159312>

Objective: Data which indicate a greater role of the central nervous system in the etiology of fibromyalgia are increasing. The goal of the present study is to determine the link between fibromyalgia and attention-deficit hyperactivity disorder (ADHD) and, in addition, to reveal the relevance of impulsivity dimension.

Methods: The study included 78 females with fibromyalgia who applied to a physical medicine and rehabilitation polyclinic in Ceyhan State Hospital and 54 healthy females. The diagnosis of fibromyalgia was made by an experienced specialist of physical medicine and rehabilitation based on the American Rheumatology Association Diagnostic Criteria (2010). The diagnosis of ADHD was by an experienced psychiatrist using *Diagnostic and Statistical Manual of Mental Disorders-5*. The following inventories were used: adult ADHD self-report scale, Wender Utah rating scale, and Barratt impulsivity scale short form.

Results: Adult ADHD was detected in 29.5% of the fibromyalgia group and 7.4% of the control group; childhood and adolescent attention hyperactivity disorder ratios in these groups were 33.3% and 11.1%, respectively. The differences were statistically significant ($P=0.002$, $P=0.003$). Scores of the fibromyalgia group on the Wender Utah rating scale, adult ADHD self-report scale, attention subscale, hyperactivity–impulsivity subscale, and the Barratt impulsivity scale for non-planning and attentional impulsivity were found to be significantly higher than the control group ($P<0.05$, $P<0.01$, $P<0.01$, $P<0.05$, $P<0.01$, $P<0.05$, respectively).

Conclusion: The present study has shown that both adult and childhood ADHD are quite common in female fibromyalgia patients. There was a link between fibromyalgia and impulsivity. Certain subtypes of fibromyalgia and attention-deficit hyperactivity deficit disorder could be sharing the common etiological pathways.

62 A. NUTRITION/VITAMINS**Vit. D and OA****Original Paper****Vitamin D Status and Patient Outcomes after Knee or Hip Surgery: A Meta-Analysis**Zhang H.^a · Zhu X.^b · Dong W.^c · Wang Q.-M.^d

Ann Nutr Metab 2018;73:121–130

<https://doi.org/10.1159/000490670>

Background: This study evaluates the effect of vitamin D status in patient outcomes after hip or knee joint surgery.

Method: Literature search was carried out in electronic databases, and study selection followed predetermined eligibility criteria. Data were extracted from relevant studies and meta-analyses of standardized mean differences between hypovitaminosis D (vitamin D deficiency or insufficiency) and euvitaminosis D in assessment scores of patient-reported outcomes were performed.

Results: A total of 12 studies (2,593 patients; age 69.89 years [95% CI 68.07–71.70]; 35.95% [29.43–42.46] males) were included in the meta-analysis. The prevalence of hypovitaminosis D (vitamin D deficiency or insufficiency) was 33.18% [25.10–41.26], but the combined prevalence of deficiency and insufficiency was 46.99 [34.02–59.96]. Hospital stay was 1.09 days [–0.39 to 2.56] longer in the hypovitaminosis D group compared to the euvitaminosis D group. Preoperatively, Harris Hip Score (HHS) and Knee Society Score were significantly lower ($p = 0.001$ and $p = 0.00001$, respectively) in the hypovitaminosis D group than in the euvitaminosis D group. Postoperatively, HHS ($p = 0.004$) score was significantly lower in the hypovitaminosis D group than in the euvitaminosis D group.

Conclusion: The prevalence of hypovitaminosis D is high in osteoarthritis patients undergoing knee or hip surgery. Vitamin D deficiency may affect the outcomes of orthopedic joint surgery. However, randomized trial/s will be required to confirm these findings.

Plant based diet helps inflammation

Journal Summaries in Family Medicine

Consumption of a defined, plant-based diet reduces lipoprotein(a), inflammation, and other atherogenic lipoproteins and particles within four weeks

Clinical Cardiology — Najjar RS, et al. | July 25, 2018

Whether consumption of a defined, plant-based diet for four weeks reduces lipoprotein(a) [Lp(a)], was investigated in this secondary analysis of a previous trial on overweight and obese individuals (n=31) with low-density lipoprotein cholesterol concentrations >100 mg/dL. Study participants consumed a defined, plant-based diet for four weeks. Data analysis was carried out using a paired samples t-test.

Findings demonstrated a favorable impact of a defined, plant-based diet on Lp(a), inflammatory indicators, and other atherogenic lipoproteins and particles. In this protocol, a substantial reduction in Lp(a) concentration was brought about by a defined plant-based diet.

Vits and frailty

Low vitamin intake is associated with risk of frailty in older adults

Teresa Balboa-Castillo Ellen A Struijk Esther Lopez-Garcia José R Banegas Fernando Rodríguez-Artalejo Pilar Guallar-Castillon

Age and Ageing, afy105, <https://doi.org/10.1093/ageing/afy105>

Background

the association between vitamin intake and frailty has hardly been studied. The objective was to assess the association of dietary vitamin intake with incident frailty in older adults from Spain.

Methods

data came from a cohort of 1,643 community-dwelling individuals aged ≥ 65 , recruited in 2008–10 and followed up prospectively throughout 2012. At baseline, 10 vitamins were assessed (vitamin A, thiamine, riboflavin, niacin, vitamins B6, B12, C, D, E and folates) using a validated face-to-face diet history. Incident frailty was identified using Fried's definition as having ≥ 3 of the following five criteria: unintentional weight loss of ≥ 4.5 kg, exhaustion, weakness, slow walking speed and low physical activity. Nonadherence to the recommended dietary allowances (RDA) was considered when the intake of a vitamin was below the recommendation. Analyses were performed with logistic regression and adjusted for main confounders.

Results

during a 3.5-year follow-up, 89 (5.4%) participants developed frailty. The odds ratios (95% confidence interval) of frailty for those in the lowest versus the highest tertile of vitamin intake were 2.80 (1.38–5.67), P -trend: 0.004, for vitamin B6; 1.65 (0.93–2.95), P -trend: 0.007, for vitamin C; 1.93 (0.99–3.83), P -trend: 0.06, for vitamin E and 2.34 (1.21–4.52), P -trend: 0.01, for folates. Nonadherence to the RDAs of vitamins was related to frailty for thiamine odds ratio (OR): 2.09 (1.03–4.23); niacin OR: 2.80 (1.46–5.38) and vitamin B6; 2.23 (1.30–3.83). When considering tertiles of RDAs for the 10 vitamins those who met < 5 RDAs had a higher risk of frailty, OR: 2.84 (1.34–6.03); P -trend: < 0.001 , compared to those who met > 7 .

Conclusion

a lower intake of vitamins B6, C, E and folates was associated with a higher risk of frailty. Not meeting RDAs for vitamins was also strongly associated.

Coffee and decreased CA incidence

Cancer Epidemiol Biomarkers Prev. 2018 May 18. doi: 10.1158/1055-9965.EPI-18-0093.

Prospective Study of Coffee Consumption and Cancer Incidence in Non-White Populations.

Park SY¹, Freedman ND², Haiman CA^{3,4}, Le Marchand L¹, Wilkens LR¹, Setiawan VW^{5,4}.

Author information

Abstract

Background: Coffee intake has been associated with risk of various cancers, but the findings, mostly from studies in white populations, are inconsistent. We examined the association of coffee consumption with overall cancer incidence and specific cancer sites in a large prospective study of African Americans, Native Hawaiians, Japanese Americans, Latinos, and whites.

Methods: 167,720 participants of the Multiethnic Cohort Study in Hawaii and Los Angeles were included. Baseline coffee intake was assessed by a validated food-frequency questionnaire. HRs and 95% confidence intervals (CIs) for sixteen cancers associated with coffee intake were calculated using Cox regressions.

Results: During a mean follow-up of 15.3 years, 34,031 incident cancer cases were identified among study participants. Coffee intake was associated inversely with liver (≥ 4 cups/day vs. none: HR = 0.57; 95% CI, 0.38-0.87; $P_{\text{trend}} < 0.001$), ovarian (HR = 0.33; 95% CI, 0.17-0.65; $P_{\text{trend}} = 0.007$), and thyroid (HR = 0.44; 95% CI, 0.23-0.87; $P_{\text{trend}} = 0.007$) cancers and melanoma (HR = 0.72; 95% CI, 0.52-0.99; $P_{\text{trend}} = 0.002$). Coffee intake was also inversely associated with endometrial cancer among women with a body mass index $> 30 \text{ kg/m}^2$ (HR=0.31; 95% CI, 0.14-0.72; $P_{\text{trend}} = 0.04$). The associations were similar across five ethnic groups ($P_{\text{heterogeneity}} > 0.06$) and were mainly observed among those who drank caffeinated coffee.

Conclusions: On the basis of our prospective data in diverse populations, we found a decreased risk of liver, ovarian, thyroid, and endometrial cancers and melanoma associated with higher coffee intake. **Impact:** These results suggest that coffee drinking may protect against liver, ovarian, thyroid, and endometrial cancers, and melanoma. *Cancer Epidemiol Biomarkers Prev*; 27(8); 1-8. ©2018 AACR.

62 B. CRYOTHERAPY

Use in surgery

Original Article**Cryotherapy relieves pain and edema following inguinal hernioplasty in males with end-stage renal disease: A prospective randomized study**YangZhengMD^aLi-JunYanMD^b<https://doi.org/10.1016/j.jpainsymman.2018.07.007>Get rights and content**Abstract****Context**

Tension free hernioplasty under local anesthetic infiltration is a reasonable choice for end-stage renal disease patients with hernia.

Objectives

The purpose of the study was to investigate the feasibility of cryotherapy following hernioplasty surgery to relieve pain and scrotal edema.

Methods

This was a prospective, randomized, controlled trial held in a large integrated health care facility in South China. One hundred and sixty-nine male patients on hemodialysis and scheduled for hernioplasty were enrolled between March 2013 and February 2017. The participants were divided into an intervention group and a control group. In the intervention group, ice packs were applied following surgery. Demographic information, vital signs, pain score, opioid consumption, wound inflammation, scrotal edema, and patient satisfaction were compared between the two groups. The primary outcome was pain score.

Results

Cryotherapy-treated patients required less opioid consumption (5.95 vs. 15.29mg, $P<0.05$), reported lower pain scores from 30 min to 48 h post operation ($P<0.05$), less wound inflammation (11.90 vs. 32.94%, $P<0.05$), lower incidence of scrotal edema in the first and second day ($P<0.05$), and higher patient satisfaction (8.95 vs. 6.50cm, $P<0.05$), with stable vital signs throughout the monitoring period ($P>0.05$).

Conclusion

Owing to its favorable cost, convenience, and low frequency of adverse effects, cryotherapy is useful for end-stage renal disease populations following hernioplasty to relieve pain and scrotal edema.