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1. LUMBAR SPINE

2. LBP

Neural processes

[PLoS One](#). 2015 Nov 16;10(11):e0142391. doi: 10.1371/journal.pone.0142391. eCollection 2015.

Differential Neural Processing during Motor Imagery of Daily Activities in Chronic Low Back Pain Patients.

[Vrana A](#)^{1,2}, [Hotz-Boendermaker S](#)¹, [Stämpfli P](#)^{3,4}, [Hänggi J](#)⁵, [Seifritz E](#)³, [Humphreys BK](#)¹, [Meier ML](#)^{1,6}.

[Author information](#)

Abstract

Chronic low back pain (chronic LBP) is both debilitating for patients but also a major burden on the health care system. Previous studies reported various maladaptive structural and functional changes among chronic LBP patients on spine- and supraspinal levels including behavioral alterations. However, evidence for cortical reorganization in the sensorimotor system of chronic LBP patients is scarce. Motor Imagery (MI) is suitable for investigating the cortical sensorimotor network as it serves as a proxy for motor execution. Our aim was to investigate differential MI-driven cortical processing in chronic LBP compared to healthy controls (HC) by means of functional magnetic resonance imaging (fMRI). Twenty-nine subjects (15 chronic LBP patients, 14 HC) were included in the current study. MI stimuli consisted of randomly presented video clips showing every-day activities involving different whole-body movements as well as walking on even ground and walking downstairs and upstairs. Guided by the video clips, subjects had to perform MI of these activities, subsequently rating the vividness of their MI performance. Brain activity analysis revealed that chronic LBP patients exhibited significantly reduced activity compared to HC subjects in MI-related brain regions, namely the left supplementary motor area and right superior temporal sulcus. Furthermore, psycho-physiological-interaction analysis yielded significantly enhanced functional connectivity (FC) between various MI-associated brain regions in chronic LBP patients indicating diffuse and non-specific changes in FC. Current results demonstrate initial findings about differences in MI-driven cortical processing in chronic LBP pointing towards reorganization processes in the sensorimotor network.

PMID:

26569602

Out of pocket costs limit access

[Phys Ther](#). 2015 Nov 25. [Epub ahead of print]

Impact of Out-of-Pocket Expenditure on PT Utilization for Non-Specific Low Back Pain: Secondary Analysis of the Medical Expenditure Panel Survey Data.

[Dolot J](#)¹, [Viola D](#)², [Shi Q](#)³, [Hyland M](#)⁴.

[Author information](#)

Abstract

BACKGROUND:

Physical therapy decreases low back pain, improves function and may lead to decreased medical services use. However, factors predicting physical therapy utilization for patients with low back pain are not well understood.

OBJECTIVE:

Identify the impact of out-of-pocket expenditure on physical therapy utilization for U.S. adults with non-specific low back pain.

DESIGN:

Secondary analysis of retrospective MEPS data.

METHODS:

Subjects were U.S. adults with non-specific low back pain. The outcome variable was the number of visits per episode of care. The research variable was out-of-pocket expenditure. Covariate variables were SF-12 component scores. Descriptive statistics and multiple linear regression analyses were performed.

RESULTS:

314 adults met the inclusion criteria and submitted SF-12 scores, representing nearly 4 million adults. Out-of-pocket expenditure, physical component score and the age-insurance category "18-64 year with public coverage only for all of the year or uninsured all of the year" negatively predicted visits per episode of care in the final regression model.

LIMITATIONS:

Non-experimental design; lacked information about symptom severity and content of physical therapy; SF-12 scores were not taken coincidental with the episode of care.

CONCLUSIONS:

Out-of-pocket expenditure negatively predicts physical therapy utilization. More research is needed to identify all factors influencing physical therapy utilization so that effective health policies may be developed.

© 2015 American Physical Therapy Association.

PMID:

26608328

3. DISC

Trauma

[Spine \(Phila Pa 1976\)](#). 2015 Dec;40(23):1799-806. doi: 10.1097/BRS.0000000000001186.

Leukocytes Enhance Inflammatory and Catabolic Degenerative Changes in the Intervertebral Disc After Endplate Fracture In Vitro Without Infiltrating the Disc.

[Dudli S¹](#), [Boffa DB](#), [Ferguson SJ](#), [Haschtmann D](#).

Author information

Abstract

STUDY DESIGN:

An established rabbit intervertebral disc (IVD)/endplate explant fracture model was extended with physiologic post-traumatic dynamic loading (PTDL) and coculturing of peripheral blood mononuclear cells (PBMCs).

OBJECTIVE:

The aim of this study was to quantify the effects of PTDL and of cocultured PBMCs on post-traumatic disc degeneration (DD) and to determine whether PTDL facilitates homing of PBMC to fractured IVD/endplates.

SUMMARY OF BACKGROUND DATA:

DD is associated with endplate fracture. In vivo studies suggest a key role of immune cells in the pathogenesis of DD. However, the complexity of in vivo systems impedes the investigation of single factors governing the pathogenesis.

METHODS:

Seventy-two IVD/endplate specimens were divided into 4 groups. In group A, endplate fractures were induced with a high-velocity axial load and exposed to PTDL in coculture with PBMCs for 14 days. Group A was compared with 3 control groups, with single-factor removal, in order to assess the relative contribution of PTDL (group B), PBMCs (group C), and endplate fracture (group D) to the biological response of the IVD. Disc gene transcription and serum nitric oxide (NO) serum concentration were measured to investigate differences in anabolism, catabolism, and inflammatory response between the groups. Changes in matrix composition and disc structure were assessed histologically.

RESULTS:

PBMCs did not home to fractured IVDs, with or without PTDL. Group A compared with group D showed an enhanced transcription of anabolic, catabolic, and pro-inflammatory genes during the entire experiment, and an increased NO concentration for the first 3 days. Changes typical for DD were also found in histological sections. Group A compared with group C showed significant increases in catabolic and pro-inflammatory gene transcription after at least 7 days. No differences were found between groups A and B.

CONCLUSION:

Trauma induces degenerative changes; PTDL neither aggravates nor ameliorates this response. Although PBMCs do not infiltrate the disc, they aggravate the degenerative changes.

LEVEL OF EVIDENCE:

N/A.

PMID:

26571062

4. INJECTIONS

5. SURGERY

Non fusions

Eur Spine J. 2015 Nov 17. [Epub ahead of print]

Short-term effects of a dynamic neutralization system (Dynesys) for multi-segmental lumbar disc herniation.

[Wang Q¹](#), [Liu J²](#), [Shi Y³](#), [Chen Y³](#), [Yu H³](#), [Ma J³](#), [Ren W³](#), [Yang H³](#), [Wang H³](#), [Xiang L⁴](#).

[Author information](#)

Abstract

PURPOSE:

To determine the safety and short-term curative effects of internal fixation using a dynamic neutralization system (Dynesys) for multi-segmental lumbar disc herniation (ms-LDH) with the control group treated by posterior lumbar interbody fusion (PLIF).

METHODS:

Forty-five patients with ms-LDH were selected as study group treated with Dynesys and 40 patients as control group with PLIF. The surgical efficacy was evaluated by comparing the visual analogue scale (VAS) scores, the Oswestry Disability Index (ODI) scores and the ROMs of the adjacent segment before and after surgery. The postoperative complications related to the implants were identified.

RESULTS:

All patients were followed up for an average duration of over 30 months. Dynesys stabilization resulted in significantly higher preservation of motion at the index level ($p < 0.001$), and significantly less ($p < 0.05$) hypermobility at the adjacent segments. VAS for back and leg pain and ODI improved significantly ($p < 0.05$) with both the methods, but there was no significant difference between the groups.

CONCLUSIONS:

The non-fusion fixation system Dynesys is safe and effective regarding short-term curative effects for the treatment of ms-LDH.

KEYWORDS:

Dynamic neutralization system (Dynesys); Multi-segmental lumbar disc herniation (ms-LDH); Non-fusion; Posterior lumbar interbody fusion (PLIF)

PMID:

26577393

6. PELVIC GIRDLE

Hernia repair

[Hernia](#). 2015 Nov 21. [Epub ahead of print]

Chronic groin pain, discomfort and physical disability after recurrent groin hernia repair: impact of anterior and posterior mesh repair.

[Sevonius D¹](#), [Montgomery A²](#), [Smedberg S³](#), [Sandblom G⁴](#).

[Author information](#)

Abstract

Chronic pain and physical disability are well-known problems after primary groin hernia surgery, but the outcome after recurrent hernia surgery is much less known.

PURPOSE:

To study the impact of anterior mesh repair (AMR) and posterior mesh repair (PMR) on chronic pain and disability after first recurrent groin hernia surgery in a population-based cohort derived from the Swedish Hernia Register.

METHODS:

Consecutive unilateral, first and second recurrent hernia repairs, registered between 1998 and 2007, were included. Follow-up was performed in 2009 based on the Inguinal Pain Questionnaire (IPQ) and selective clinical examination, comparing prevalence of pain between AMR, endoscopic (E-PMR) and open posterior mesh repairs (O-PMR) after first recurrent repair. Chronic pain after a second recurrent repair was analysed.

RESULTS:

Altogether 671 first recurrent repairs were analysed: 329 AMRs, 161 E-PMRs and 181 O-PMRs. IPQ response rate was 70.6 %. If the index repair was anterior, the E-PMR was associated with a lower risk of chronic pain and disability compared to AMR [OR 0.54 (CI 0.30-0.97), p = 0.039]. The risk of chronic pain increased after a second recurrent repair. A surgeon's annual volume >5 O-PMRs was related to a lower risk compared to ≤5 [OR 0.42 (CI 0.19-0.94), p = 0.034].

CONCLUSION:

Endoscopic repair for first recurrent groin hernia surgery, after an index anterior repair, was associated with less chronic pain, discomfort and disability compared to anterior approach. Chronic pain increased after a second recurrent repair. A high surgeon's volume reduced the risk of chronic pain after open posterior mesh repair.

KEYWORDS:

Chronic pain; Groin hernia; Hernia register; Inguinal hernia; Mesh repair; Physical disability; Preperitoneal; Recurrence; Rerecurrence; Surgeon volume

PMID:

26590934

7. PELVIC ORGANS/WOMAN'S HEALTH

Vestibulodynia

[Send to:](#)

[Am J Obstet Gynecol](#). 2015 Nov 25. pii: S0002-9378(15)02348-0. doi: 10.1016/j.ajog.2015.11.019. [Epub ahead of print]

Familiality analysis of provoked vestibulodynia treated by vestibulectomy supports genetic predisposition.

[Morgan TK](#)¹, [Allen-Brady KL](#)², [Monson MA](#)³, [Leclair CM](#)⁴, [Sharp HT](#)³, [Cannon-Albright LA](#)⁵.

[Author information](#)

[Abstract](#)

BACKGROUND:

Provoked vestibulodynia is a poorly understood disease that affects 8-15% of women in their lifetime. There is significant inflammation and nerve growth in vestibular biopsies from affected women treated by vestibulectomy compared with matched female population controls without vestibulodynia. The triggers leading to this neurogenic inflammation are unknown, but they are likely multifactorial.

OBJECTIVE:

Our objective was to determine whether vestibulodynia is more common in close and distantly related female relatives of women diagnosed with the disease and those specifically treated by vestibulectomy. Excess familial clustering would support a potential genetic predisposition for vestibulodynia and warrant further studies to isolate risk alleles.

STUDY DESIGN:

Using population-based genealogy linked to University of Utah Hospital CPT coded data, we estimated the relative risk of vestibulectomy in female relatives of affected women. We also compared the average pairwise relatedness of cases to the expected relatedness of the population and identified high disease burden pedigrees.

RESULTS:

183 potential vestibulectomy probands were identified using CPT codes. The relative risk of vestibulectomy was elevated in first degree (20 [6.6-47], $p < 0.00001$), second degree (4.5 [0.5-16], $p = 0.07$), and third degree female relatives (3.4 [1.2-8.8], $p = 0.03$). Seventy of these 183 CPT-based probands had available clinical history to confirm a diagnosis of moderate to severe vestibulodynia. Notably, this smaller group of confirmed probands ($n = 70$) revealed a similar familiarity in first degree (54 [17.5-126], $p < 0.00001$), second degree (19.7 [2.4-71], $p = 0.005$), and third degree relatives (12 [3.3-31], $p = 0.0004$), despite less statistical power for analysis. Overall, the average pairwise relatedness of affected women was significantly higher than expected ($p < 0.001$) and a number of high disease burden Utah families were identified.

CONCLUSIONS:

Our data suggest vestibulodynia treated by vestibulectomy has a genetic predisposition. Future studies will identify candidate genes by linkage analysis in affected families and sequencing of distantly related probands.

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KEYWORDS:

Utah Population Database; Vestibulodynia; familiarity; genetics; vestibulectomy

PMID:

26627726

Exercise and pelvic pain/postnatally

[BMC Pregnancy Childbirth](#). 2015 Nov 26;15:316. doi: 10.1186/s12884-015-0736-4.

A systematic review of randomised controlled trials on the effectiveness of exercise programs on Lumbo Pelvic Pain among postnatal women.

[Tseng PC](#)¹, [Puthussery S](#)², [Pappas Y](#)³, [Gau ML](#)⁴.

[Author information](#)

Abstract

BACKGROUND:

A substantial number of women tend to be affected by Lumbo Pelvic Pain (LPP) following child birth. Physical exercise is indicated as a beneficial method to relieve LPP, but individual studies appear to suggest mixed findings about its effectiveness. This systematic review aimed to synthesise evidence from randomised controlled trials on the effectiveness of exercise on LPP among postnatal women to inform policy, practice and future research.

METHODS:

A systematic review was conducted of all randomised controlled trials published between January 1990 and July 2014, identified through a comprehensive search of following databases: PubMed, PEDro, Embase, Cinahl, Medline, SPORTDiscus, Cochrane Pregnancy and Childbirth Group's Trials Register, and electronic libraries of authors' institutions. Randomised controlled trials were eligible for inclusion if the intervention comprised of postnatal exercise for women with LPP onset during pregnancy or within 3 months after delivery and the outcome measures included changes in LPP. Selected articles were assessed using the PEDro Scale for methodological quality and findings were synthesised narratively as meta-analysis was found to be inappropriate due to heterogeneity among included studies.

RESULTS:

Four randomised controlled trials were included, involving 251 postnatal women. Three trials were rated as of 'good' methodological quality. All trials, except one, were at low risk of bias. The trials included physical exercise programs with varying components, differing modes of delivery, follow up times and outcome measures. Intervention in one trial, involving physical therapy with specific stabilising exercises, proved to be effective in reducing LPP intensity. An improvement in gluteal pain on the right side was reported in another trial and a significant difference in pain frequency in another.

CONCLUSION:

Our review indicates that only few randomised controlled trials have evaluated the effectiveness of exercise on LPP among postnatal women. There is also a great amount of variability across existing trials in the components of exercise programs, modes of delivery, follow up times and outcome measures. While there is some evidence to indicate the effectiveness of exercise for relieving LPP, further good quality trials are needed to ascertain the most effective elements of postnatal exercise programs suited for LPP treatment.

PMID:

26612732

Diet and breast cancer

[Am J Clin Nutr.](#) 2015 Nov 25. pii: ajcn101436. [Epub ahead of print]

Vegetable and fruit consumption and the risk of hormone receptor-defined breast cancer in the EPIC cohort.

[Emaus MJ¹](#), [Peeters PH²](#), [Bakker MF¹](#), [Overvad K³](#), [Tjønneland A⁴](#), [Olsen A⁴](#), [Romieu J⁵](#), [Ferrari P⁵](#), [Dossus L⁶](#), [Boutron-Ruault MC⁶](#), [Baglietto L⁷](#), [Fortner RT⁸](#), [Kaaks R⁸](#), [Boeing H⁹](#), [Trichopoulou A¹⁰](#), [Lagiou P¹¹](#), [Trichopoulos D¹²](#), [Masala G¹³](#), [Pala V¹⁴](#), [Panico S¹⁵](#), [Tumino R¹⁶](#), [Polidoro S¹⁷](#), [Skeie G¹⁸](#), [Lund E¹⁸](#), [Weiderpass E¹⁹](#), [Quirós JR²⁰](#), [Travier N²¹](#), [Sánchez MJ²²](#), [Chirlaque MD²³](#), [Ardanaz E²⁴](#), [Dorransoro M²⁵](#), [Winkvist A²⁶](#), [Wennberg M²⁷](#), [Bueno-de-Mesquita HB²⁸](#), [Khaw KT²⁹](#), [Travis RC³⁰](#), [Key TJ³⁰](#), [Aune D³¹](#), [Gunter M³¹](#), [Riboli E³¹](#), [van Gils CH³²](#).

[Author information](#)

[Abstract](#)

BACKGROUND:

The recent literature indicates that a high vegetable intake and not a high fruit intake could be associated with decreased steroid hormone receptor-negative breast cancer risk.

OBJECTIVE:

This study aimed to investigate the association between vegetable and fruit intake and steroid hormone receptor-defined breast cancer risk.

DESIGN:

A total of 335,054 female participants in the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort were included in this study (mean \pm SD age: 50.8 \pm 9.8 y). Vegetable and fruit intake was measured by country-specific questionnaires filled out at recruitment between 1992 and 2000 with the use of standardized procedures. Cox proportional hazards models were stratified by age at recruitment and study center and were adjusted for breast cancer risk factors.

RESULTS:

After a median follow-up of 11.5 y (IQR: 10.1-12.3 y), 10,197 incident invasive breast cancers were diagnosed [3479 estrogen and progesterone receptor positive (ER+PR+); 1021 ER and PR negative (ER-PR-)]. Compared with the lowest quintile, the highest quintile of vegetable intake was associated with a lower risk of overall breast cancer (HR_{quintile 5-quintile 1}: 0.87; 95% CI: 0.80, 0.94). Although the inverse association was most apparent for ER-PR- breast cancer (ER-PR-: HR_{quintile 5-quintile 1}: 0.74; 95% CI: 0.57, 0.96; P-trend = 0.03; ER+PR+: HR_{quintile 5-quintile 1}: 0.91; 95% CI: 0.79, 1.05; P-trend = 0.14), the test for heterogeneity by hormone receptor status was not significant (P-heterogeneity = 0.09). Fruit intake was not significantly associated with total and hormone receptor-defined breast cancer risk.

CONCLUSION:

This study supports evidence that a high vegetable intake is associated with lower (mainly hormone receptor-negative) breast cancer risk.

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KEYWORDS:

breast cancer; estrogen receptor; fruit; progesterone receptor; vegetables

PMID:

26607934

8. VISCERA

Gut inflammation and ankylosing spondylitis

[Curr Opin Rheumatol](#). 2016 Jan;28(1):89-96. doi: 10.1097/BOR.0000000000000239.

Subclinical gut inflammation in ankylosing spondylitis.

[Ciccia F](#), [Rizzo A](#), [Triolo G](#).

[Author information](#)

[Abstract](#)

PURPOSE OF REVIEW:

Subclinical gut inflammation has been described in a significant proportion of patients with ankylosing spondylitis (AS), up to 10% of them developing it during the time of clinically overt inflammatory bowel disease. Histologic, immunologic, and intestinal microbiota alterations characterize the AS gut.

RECENT FINDINGS:

Microbial dysbiosis as well as alterations of innate immune responses have been demonstrated in the gut of AS. Furthermore, a growing body of evidence suggests that the gut of AS patients may be actively involved in the pathogenesis of AS through the production of proinflammatory cytokines, such as IL-23p19, and the differentiation of potentially pathogenic innate lymphoid cells producing IL-22 and IL-17. Finally, a strong correlation between the presence of subclinical gut inflammation and the degree of spine inflammation have been also proved in AS.

SUMMARY:

Subclinical gut inflammation and innate immune responses in AS may be considered a possible consequence of microbial dysbiosis. Relationships between cause and effect remain, however, to be answered.

PMID:

26599385

9. THORACIC SPINE

10 A. CERVICAL SPINE

10 B. CERVICAL EXERCISES

Training

Comparison of cranio-cervical flexion training versus cervical proprioception training in patients with chronic neck pain: A randomized controlled clinical trial

Journal of Rehabilitation Medicine, 12/02/2015Izquierdo TG, et al.

The authors aim to compare the effects of cranio–cervical flexion vs cervical proprioception training on neuromuscular control, pressure pain sensitivity and perceived pain and disability in patients with chronic neck pain. Both specific cranio–cervical flexion training and proprioception training had a comparable effect on performance on the cranio–cervical flexion test, a test of the neuromuscular control of the deep cervical flexors. These results indicate that proprioception training may have positive effects on the function of the deep cervical flexors.

Methods

- Twenty-eight volunteers with chronic non-specific neck pain were randomly assigned to 1 of 2 interventions and undertook 6 physiotherapist-supervised sessions over a period of 2 months.
- Both groups performed daily home exercise.

- Performance on the cranio-cervical flexion test, pressure pain thresholds and reported levels of pain and disability were measured before and immediately after the first treatment session, 1 month after starting treatment and 2 months after starting treatment (at completion of the intervention).

Results

- At 2 months, both groups improved their performance on the cranio-cervical flexion test ($p < 0.05$), but this did not differ between groups ($p > 0.05$).
- Both groups showed a reduction in their pain at rest and disability at 2 months, but this was also not different between groups ($p > 0.05$).
- Pressure pain sensitivity did not change for either group.

11. UPPER C SPINE

12 A. WHIPLASH

Changes in pain tolerance

[Eur J Pain](#). 2015 Nov 16. doi: 10.1002/ejp.819. [Epub ahead of print]

Pain and pain tolerance in whiplash-associated disorders: A population-based study.

[Myrtveit SM](#)^{1,2}, [Skogen JC](#)^{2,3}, [Sivertsen B](#)^{2,4,5}, [Steingrimsdóttir ÓA](#)⁶, [Stubhaug A](#)⁷, [Nielsen CS](#)⁸.

[Author information](#)

[Abstract](#)

BACKGROUND:

Pain is a cardinal symptom in individuals with whiplash-associated disorders (WAD). We aimed to compare pain characteristics between individuals with WAD and individuals reporting chronic pain from other causes, and to determine whether potential differences were accounted for by experimental pain tolerance.

METHODS:

Data from the 6th Tromsø Study (2007-2008, $n = 12,981$) were analysed. The number of painful locations was compared between individuals with WAD and individuals reporting chronic pain from other causes using negative binomial regression, pain frequency using multinomial logistic regression and pain intensity using multiple linear regression. Differences in experimental pain tolerance (cold pressor test) were tested using Cox regression; one model compared individuals with WAD to those with chronic pain from other causes, one compared the two groups with chronic pain to individuals without chronic pain. Subsequently, regression models investigating clinical pain characteristics were adjusted for pain tolerance.

RESULTS:

Of individuals with WAD, 96% also reported other causes for pain. Individuals with WAD reported a higher number of painful locations [median (inter-quartile range): 5 (3.5-7) vs. 3 (2-5), $p < 0.001$] and higher pain intensity (crude mean difference = 0.78, $p < 0.001$) than individuals with chronic pain from other causes. Pain tolerance did not differ between these two groups. Compared to individuals without chronic pain, individuals with WAD and individuals with chronic pain from other causes had reduced pain tolerance.

CONCLUSIONS:

Individuals with WAD report more additional causes of pain, more painful locations and higher pain intensity than individuals with chronic pain from other causes. The increased pain reporting was not accounted for by pain tolerance.

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PMID:

26568528

12 B. CERVICAL SURGERIES

13. CRANIUM/TMJ

Facial asymmetries

[Eur J Orthod](#). 2015 Dec;37(6):636-42. doi: 10.1093/ejo/cju104. Epub 2015 Feb 19.

Regional facial asymmetries in unilateral orofacial clefts.

[Kuijpers MA](#)¹, [Desmedt DJ](#)², [Nada RM](#)², [Bergé SJ](#)³, [Fudalej PS](#)⁴, [Maal TJ](#)⁵.

[Author information](#)

[Abstract](#)

OBJECTIVES:

Assess facial asymmetry in subjects with unilateral cleft lip (UCL), unilateral cleft lip and alveolus (UCLA), and unilateral cleft lip, alveolus, and palate (UCLP), and to evaluate which area of the face is most asymmetrical.

METHODS:

Standardized three-dimensional facial images of 58 patients (9 UCL, 21 UCLA, and 28 UCLP; age range: 8.6-12.3 years) and 121 controls (age range 9-12 years) were mirrored and distance maps were created. Absolute mean asymmetry values were calculated for the whole face, cheek, nose, lips, and chin. One-way analysis of variance, Kruskal-Wallis, and t-test were used to assess the differences between clefts and controls for the whole face and separate areas.

RESULTS:

Clefts and controls differ significantly for the whole face as well as in all areas. Asymmetry is distributed differently over the face for all groups. In UCLA, the nose was significantly more asymmetric compared with chin and cheek ($P = 0.038$ and 0.024 , respectively). For UCL, significant differences in asymmetry between nose and chin and chin and cheek were present ($P = 0.038$ and 0.046 , respectively). In the control group, the chin was the most asymmetric area compared to lip and nose ($P = 0.002$ and $P = 0.001$, respectively) followed by the nose ($P = 0.004$). In UCLP, the nose, followed by the lips, was the most asymmetric area compared to chin, cheek ($P < 0.001$ and $P = 0.016$, respectively).

LIMITATIONS:

Despite division into regional areas, the method may still exclude or underrate smaller local areas in the face, which are better visualized in a facial colour coded distance map than quantified by distance numbers. The UCL subsample is small.

CONCLUSION:

Each type of cleft has its own distinct asymmetry pattern. Children with unilateral clefts show more facial asymmetry than children without clefts.

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PMID:

25700990

Occlusions

[Int J Oral Maxillofac Surg](#). 2015 Nov 18. pii: S0901-5027(15)01389-2. doi: 10.1016/j.ijom.2015.10.019. [Epub ahead of print]

Assessment of the changes in quality of life of patients with class II and III deformities during and after orthodontic-surgical treatment.

[Baherimoghaddam T1](#), [Tabrizi R2](#), [Naseri N3](#), [Pouzesh A4](#), [Oshagh M5](#), [Torkan S6](#).

[Author information](#)

Abstract

The aim of this longitudinal study was to assess and compare the oral health-related quality of life (OHRQoL) of patients with class II and III deformities during and after orthodontic-surgical treatment. Thirty class III and 28 class II patients were evaluated at baseline (T0), just prior to surgery (T1), at 6 months after surgery (T2), and at 12 months after debonding (T3). OHRQoL was assessed using the Oral Health Impact Profile (OHIP-14). Friedman two-way analysis of variance and the Wilcoxon signed-rank test were performed to compare the relative changes in OHRQoL during treatment. Significant changes in the overall OHIP-14 scores were observed during and after orthodontic-surgical treatment in both groups. During the pre-surgical stage, psychological discomfort and psychological disability decreased in class III patients, and class II patients experienced a significant deterioration in psychological discomfort during the same period. Six months after surgery, patients in both groups showed improvements in psychological discomfort, social disability, and handicap. Physical disability and functional limitation showed further improvement at 12 months after debonding in class II patients. This study reaffirms that orthodontic-surgical treatment has a significant effect on the OHRQoL of class III and class II patients.

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KEYWORDS:

OHIP index; dentofacial deformity; oral health-related quality of life; orthognathic surgery

PMID:

26603194

TMJ pain modulation

[Pain](#). 2015 Dec;156(12):2545-55. doi: 10.1097/j.pain.0000000000000325.

Somatosensory assessment and conditioned pain modulation in temporomandibular disorders pain patients.

[Kothari SF¹](#), [Baad-Hansen L](#), [Oono Y](#), [Svensson P](#).

[Author information](#)**Abstract**

The pathophysiology and underlying pain mechanisms of temporomandibular disorders (TMD) are poorly understood. The aims were to assess somatosensory function at the temporomandibular joints (TMJs) and to examine whether conditioned pain modulation (CPM) differs between TMD pain patients (n = 34) and healthy controls (n = 34). Quantitative sensory testing was used to assess the somatosensory function. Z-scores were calculated for patients based on reference data. Conditioned pain modulation was tested by comparing pressure pain thresholds (PPTs) before, during, and after the application of painful and nonpainful cold stimuli. Pressure pain thresholds were measured at the most painful TMJ and thenar muscle (control). Data were analyzed with analyses of variance. Most (85.3%) of the patients exhibited at least 1 or more somatosensory abnormalities at the most painful TMJ with somatosensory gain with regard to PPT and punctate mechanical pain stimuli, and somatosensory loss with regard to mechanical detection and vibration detection stimuli as the most frequent abnormalities. There was a significant CPM effect (increased PPT) at both test sites during painful cold application in healthy controls and patients ($P < 0.001$). There was no significant difference in the relative CPM effect during painful cold application between groups ($P = 0.227$).

In conclusion, somatosensory abnormalities were commonly detected in TMD pain patients and CPM effects were similar in TMD pain patients and healthy controls.

PMID:

26307861

Swallowing

[Dysphagia](#). 2015 Nov 25. [Epub ahead of print]

The Effect of the Cervical Orthosis on Swallowing Physiology and Cervical Spine Motion During Swallowing.

[Mekata K](#)¹, [Takigawa T](#)², [Matsubayashi J](#)³, [Toda K](#)⁴, [Hasegawa Y](#)⁴, [Ito Y](#)⁵.

[Author information](#)**Abstract**

Cervical orthosis is used to immobilize the neck in various disorders such as trauma and post-operation. However, it is still uncertain how cervical orthosis restricts the degree of movement of the cervical spine during swallowing and how they affect swallowing physiology. The purpose of this study was to evaluate these issues using the Philadelphia[®] Collar. We conducted videofluorography of swallowing in 39 healthy subjects (23 men, 16 women; mean age of 34.3 years) with and without cervical orthosis. To compare the two conditions regarding the cervical spine motion, we determined the angular and positional changes of the occipital bone (C0) and each cervical vertebra (C1-C7) from the oral phase to the pharyngeal phase. Similarly, to compare swallowing physiology, we assessed the start and end times and the durations of soft palate elevation, rapid hyoid anterosuperior movement, epiglottis inversion, closure of the laryngeal vestibule, and pharyngoesophageal segment (PES) opening. Finally, we compared the transit times of contrast agent in the two conditions. The respective extensions of C1, C2, and C3 were 0.31°, 0.07°, and 0.05° (mean) with cervical orthosis, and the respective flexions of C1, C2, and C3 were 0.98°, 1.42°, and 0.85° (mean) without. These results suggested that cervical orthosis restricted the flexion of C1-C3. Analysis of swallowing physiology revealed that the average durations of hyoid anterosuperior elevation, epiglottic inversion, and PES opening were prolonged by 0.09, 0.19, and 0.05 s, respectively.

In conclusion, the cervical orthosis restricted the movement of the cervical spine during swallowing and changed swallowing physiology.

KEYWORDS:

Cervical orthosis; Cervical spine motion; Deglutition; Deglutition disorders; Dysphagia; Swallowing; Swallowing physiology

PMID:

26607160

14. HEADACHES

15. VESTIBULAR

16. CONCUSSIONS

Genetics

Genetics affect concussion recovery

Pennsylvania State University Health and Medicine News, 11/27/2015

New Penn State research suggests genetics plays a major role in determining how quickly a concussed athlete recovers. Peter Arnett, professor of psychology and director of clinical training at Penn State, has observed hundreds of concussed athletes in his lab over the last ten years and often wondered why some athletes would recover more rapidly than others. He led a team of researchers to find out, and their work was recently published in the Journal of the International Neuropsychological Society. According to Arnett, this is the first study to examine and establish a relationship between the e4 allele and post-concussion-symptom reporting patterns among concussed collegiate athletes. “Our results overwhelmingly indicate that e4 positive participants may be at a greater risk for experiencing post-concussion symptoms.”

17. SHOULDER GIRDLE

Serratus Anterior activation with push ups

[J Sport Rehabil.](#) 2015 Nov 10. [Epub ahead of print]

Effect of Humeral Elevation Angle on Electromyographic Activity in the Serratus Anterior During the Push-up Plus Exercise.

[Hwang UJ](#)¹, [Kwon OY](#), [Jeon IC](#), [Kim SH](#), [Weon JH](#).

Author information

Abstract

CONTEXT:

The push-up plus (PP) has been recommended for strengthening of the serratus anterior (SA). Previous studies have investigated the effect of different stability properties of the base of support to adjust the difficulty level of SA muscle-strengthening exercises in the PP position. However, it has not been investigated to find the optimal humeral elevation angle (HEA) for selective activation and maximum contraction of the SA during PP.

OBJECTIVES:

The purpose of this study was to assess the effects of HEA during PP on EMG activity in the SA, upper trapezius (UT) and pectoralis major (PM), and on the UT/SA and PM/SA activity ratios.

DESIGN:

Comparative, repeated measures design.

SETTING:

University research laboratory.

PARTICIPANTS:

29 healthy male subjects.

MAIN OUTCOME MEASURES:

The subjects performed PP at three different HEAs (60°, 90° and 120°); EMG activity in the SA, UT and PM was measured, and the UT/SA and PM/SA activity ratios were calculated. Differences in muscle activity and ratios, between the 60°, 90° and 120° HEAs, were assessed using one-way repeated analysis of variance; the Bonferroni correction was applied.

RESULTS:

SA muscle activity was significantly increased, in order of magnitude, at the 120°, 90° and 60° HEAs. UT/SA and PM/SA activity ratios were significantly greater during performance of the PP at an HEA of 60°, compared to HEAs of 120° and 90°.

CONCLUSIONS:

Our results suggest that an HEA of 120° should be used during performance of the PP because it produces greater SA activation compared to HEAs of 60° and 90°.

PMID:

26562063

18. CLAVICLE

19. GLENOHUMERAL/SHOULDER

20 A. ROTATOR CUFF

Driving

Clin Biomech (Bristol, Avon). 2015 Oct;30(8):839-46. doi: 10.1016/j.clinbiomech.2015.06.004. Epub 2015 Jun 12.

Shoulder muscle forces during driving: Sudden steering can load the rotator cuff beyond its repair limit.

Pandis P1, Prinold JA1, Bull AM2.

Author information**Abstract****BACKGROUND:**

Driving is one of the most common everyday tasks and the rotator cuff muscles are the primary shoulder stabilisers. Muscle forces during driving are not currently known, yet knowledge of these would influence important clinical advice such as return to activities after surgery. The aim of this study is to quantify shoulder and rotator cuff muscle forces during driving in different postures.

METHODS:

A musculoskeletal modelling approach is taken, using a modified driving simulator in combination with an upper limb musculoskeletal model (UK National Shoulder Model). Motion data and external force vectors were model inputs and upper limb muscle and joint forces were the outputs.

FINDINGS:

Comparisons of the predicted glenohumeral joint forces were compared to in vivo literature values, with good agreement demonstrated (61 SD 8% body weight mean peak compared to 60 SD 1% body weight mean peak). High muscle activation was predicted in the rotator cuff muscles; particularly supraspinatus (mean 55% of the maximum and up to 164 SD 27 N). This level of loading is up to 72% of mean failure strength for supraspinatus repairs, and could therefore be dangerous for some cases. Statistically significant and large differences are shown to exist in the joint and muscle forces for different driving positions as well as steering with one or both hands (up to 46% body weight glenohumeral joint force).

INTERPRETATION:

These conclusions should be a key consideration in rehabilitating the shoulder after surgery, preventing specific upper limb injuries and predicting return to driving recommendations. Copyright © 2015. Published by Elsevier Ltd.

KEYWORDS:

Daily activities; Driving; Musculoskeletal biomechanics modelling; Shoulder functionality; Steering; Supraspinatus; Surgical repair; Upper limb muscle forces

Exercise and supraspinatus tear

[J Shoulder Elbow Surg.](#) 2015 Nov 24. pii: S1058-2746(15)00485-1. doi: 10.1016/j.jse.2015.08.048. [Epub ahead of print]

Effects of exercise therapy for the treatment of symptomatic full-thickness supraspinatus tears on in vivo glenohumeral kinematics.

[Miller RM](#)¹, [Popchak A](#)², [Vyas D](#)², [Tashman S](#)², [Irrgang JJ](#)², [Musahl V](#)³, [Debski RE](#)⁴.

[Author information](#)

Abstract**BACKGROUND:**

The high incidence of rotator cuff disease combined with high failure rates for nonoperative treatment of full-thickness rotator cuff tears underlines the importance of improving nonoperative management of rotator cuff tears. The study objective was to assess changes in in vivo glenohumeral kinematics of patients with a symptomatic full-thickness supraspinatus tear before and after a 12-week exercise therapy program. It was hypothesized that successful exercise therapy would result in improved kinematics (smaller translations and increased subacromial space).

MATERIALS AND METHODS:

Five patients were recruited for the study and underwent dynamic stereoradiography analysis before and after a 12-week exercise therapy protocol to measure changes in glenohumeral joint translations and subacromial space during coronal plane abduction. Strength and patient-reported outcomes (American Shoulder and Elbow Surgeons; Disabilities of the Arm, Shoulder and Hand; Western Ontario Rotator Cuff Index) were also evaluated.

RESULTS:

After therapy, no subject went on to receive surgery. It was found that the contact path length of the humerus translating on the surface of the glenoid was reduced by 29% from 67.2% ± 36.9% glenoid height to 43.1% ± 26.9% glenoid height (P = .036) after therapy. Minimum acromiohumeral distance showed a small increase from 0.9 ± 0.6 mm to 1.3 ± 0.8 mm (P = .079). Significant improvements in strength and patient-reported outcomes were also observed (P < .05).

CONCLUSIONS:

Successful exercise therapy for treatment of small full-thickness supraspinatus tears results in improvements in glenohumeral joint kinematics and patient-reported outcomes through increases in rotator cuff muscle strength and joint stability. This study may enable identification of prognostic factors that predict the response of a patient with a rotator cuff tear to exercise therapy.

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KEYWORDS:

Shoulder; biomechanics; exercise therapy; glenohumeral joint; kinematics; rotator cuff tear

PMID:

26620280

Tendon stiffness

The deep layer of the rotator cuff tendon becomes stiffer with age: a possible cause of cuff tear

Journal of Shoulder and Elbow Surgery, 12/03/2015

Yamamoto N, et al.

The etiology of rotator cuff tear is multi-factorial, and has been attributed to both extrinsic (subacromial impingement) and intrinsic (alterations in biology, mechanical properties, and vascularity) mechanisms. Authors hypothesized that the change in tendon property was one of the causes of the rotator cuff tear. They measured the stiffness of the rotator cuff tendons in healthy volunteers of various ages with the use of ultrasound elastography.

Progression

[J Shoulder Elbow Surg.](#) 2015 Dec;24(12):1845-51. doi: 10.1016/j.jse.2015.08.038.

Patterns of tear progression for asymptomatic degenerative rotator cuff tears.

[Keener JD](#)¹, [Hsu JE](#)², [Steger-May K](#)³, [Teefey SA](#)⁴, [Chamberlain AM](#)⁵, [Yamauchi K](#)⁵.

[Author information](#)

[Abstract](#)

BACKGROUND:

The purpose of this study was to examine patterns of rotator cuff tear size progression in degenerative rotator cuff tears and to compare tear progression risks for tears with and without anterior supraspinatus tendon disruption.

METHODS:

Asymptomatic full-thickness rotator cuff tears with minimum 2-year follow-up were examined with annual shoulder ultrasound examinations. Integrity of the anterior 3 mm of the supraspinatus tendon determined classification of cable-intact vs. cable-disrupted tears. Tear enlargement was defined as an increase of 5 mm or more in width. Tear propagation direction was calculated from measured changes in tear width in reference to the biceps tendon on serial ultrasound examinations.

RESULTS:

The cohort included 139 full-thickness tears with a mean subject age of 63.3 years and follow-up duration of 6.0 years. Ninety-six (69.1%) of the tears were considered cable intact. Cable-disrupted tears were larger at baseline (median, 19.0 mm vs. 10.0 mm; $P < .0001$) than cable-intact tears. There was no difference in the risk of enlargement (52.1% vs. 67.4%; $P = .09$) or time to enlargement (3.2 vs. 2.2 years; $P = .37$) for cable-intact compared with cable-disrupted tears. There was no difference in the magnitude of enlargement for cable-intact and cable-disrupted tears (median, 7.0 mm vs. 9.0 mm; $P = .18$). Cable-intact tears propagated a median of 5 mm anteriorly and 4 mm posteriorly, whereas cable-disrupted tears propagated posteriorly.

CONCLUSIONS:

The majority of degenerative rotator cuff tears spare the anterior supraspinatus tendon. Although tears classified as cable disrupted are larger at baseline than cable-intact tears, tear enlargement risks are similar for each tear type.

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KEYWORDS:

Rotator cuff tear; progression; rotator cable; ultrasound

PMID:

26589385

External rotation strength

[J Sport Rehabil.](#) 2015 Nov 10. [Epub ahead of print]

Reliability of Isometric and Eccentric Isokinetic Shoulder External Rotation.

[Papotto BM](#)¹, [Rice T](#), [Malone T](#), [Butterfield T](#), [Uhl TL](#).

[Author information](#)

[Abstract](#)

CONTEXT:

Shoulder external rotators are challenged eccentrically throughout the deceleration phase of throwing which is thought to contribute to overuse injuries. In order to evaluate the effectiveness of intervention programs as well as identify deficits, reliable and responsive measures of isometric

and eccentric shoulder external rotation are necessary. Previously, isometric measures have primarily tested a single position and eccentric measures have not been found to have high reliability.

OBJECTIVE:

To examine the between day reliability of multiple angle isometric and dynamic eccentric isokinetic testing of shoulder external rotation.

DESIGN:

Repeated measures Participants: 10 healthy subjects (age: 30 ± 12 years, height: 166 ± 13 cm, mass: 72 ± 10 kg) Main Outcome Measures: Average isometric peak torque of shoulder external rotation at 7 angles was measured. From these values, the angle of isometric peak torque was calculated. Dynamic eccentric average peak torque, average total work and average angle of peak torque were measured.

RESULTS:

Between day reliability was high for average peak torque during isometric contractions at all angles ($ICC \geq 0.85$) as well as dynamic eccentric average peak torque ($ICC \geq 0.97$) between days. The estimated angle of isometric peak torque ($ICC \leq 0.65$) was not highly reliable between days. The average angle of peak torque from the eccentric testing produced inconsistent results. Average total work of dynamic eccentric shoulder external rotation was found to be highly reliable between days ($ICC \geq 0.97$).

CONCLUSION:

Measures of force such as peak torque and total work, in isometric and eccentric testing of the shoulder external rotator muscles can be measured reliably between days and used to objectively evaluate shoulder strength and identify changes when they occur. Angle measurements of peak torque could provide insight into the mechanical properties of the posterior shoulder muscles but were found to be inconsistent between days.

PMID:

26562351

20 B. LABRUM

21. ADHESIVE CAPSULITIS

22 A. IMPINGMENT

22 B. INSTABILITY

23. SURGERY

24. ELBOW

25. WRIST AND HAND

Wrist mechanics

[Hand Surg Eur Vol.](#) 2015 Nov 14. pii: 1753193415616939. [Epub ahead of print]

Functional kinematics of the wrist.

[Rainbow MJ](#)¹, [Wolff AL](#)², [Crisco JJ](#)³, [Wolfe SW](#)⁴.

[Author information](#)

Abstract

The purpose of this article is to review past and present concepts concerning functional kinematics of the healthy and injured wrist. To provide a context for students of the wrist, we describe the progression of techniques for measuring carpal kinematics over the past century and discuss how this has influenced today's understanding of functional kinematics. Next, we provide an overview of recent developments and highlight the clinical relevance of these findings. We use these findings and recent evidence that supports the importance of coupled motion in early rehabilitation of radiocarpal injuries to develop the argument that coupled motion during functional activities is a clinically relevant outcome; therefore, clinicians should develop a framework for its dynamic assessment. This should enable a tailored and individualized approach to the treatment of carpal injuries.

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KEYWORDS:

Carpal kinematics; carpus; dart thrower's motion; midcarpal joint; scapholunate advanced collapse (SLAC); wrist coupled motion; wrist function

PMID:

26568538

26. CARPAL TUNNEL SYNDROME

27. HIP

28. REPLACEMENTS

Same outcomes for women and men

[Clin Orthop Relat Res.](#) 2015 Dec;473(12):3849-57. doi: 10.1007/s11999-015-4479-3.

Women Demonstrate More Pain and Worse Function Before THA but Comparable Results 12 Months After Surgery.

[Mannion AF](#)¹, [Impellizzeri FM](#)², [Naal FD](#)³, [Leunig M](#)⁴.

[Author information](#)

Abstract

BACKGROUND:

Many studies report differences in patient-reported outcome measures (PROMs) for men and women undergoing total hip arthroplasty (THA). Few studies have evaluated whether these are explained by corresponding differences in important preoperative factors.

QUESTIONS/PURPOSES:

(1) Are there differences between men and women in PROM scores preoperatively and 12 months after THA? (2) Do baseline differences in comorbidity, age, body mass index (BMI), and mental health status explain these differences in PROM scores?

METHODS:

Preoperatively, 300 patients completed the Oxford Hip Score (OHS), WOMAC, and SF-12; 261 (86%) of them (129 women, 64 ± 11 years; 132 men, 66 ± 10 years) completed the same questionnaires 12 months postoperatively and also rated the acceptability of their current symptoms and change in general health.

RESULTS:

Preoperatively, women showed worse scores than men in the OHS (-1.9; 95% confidence interval, -3.6 to -0.3) and WOMAC (-6.3; -10.9 to -1.7). At 12 months postoperatively, the absolute scores for all PROMs were not significantly different. After controlling for BMI, age, comorbidity, SF-12 mental health scores, and sociodemographic characteristics, the baseline differences remained.

CONCLUSIONS:

Surgeons may be more reluctant to operate on women than men because they perceive that, because of their worse baseline status, women are likely to have worse outcomes; however, given that we found no evidence for differences in patient-reported outcomes at 12 months, these suspicions would appear to be unfounded. Women and men can be expected to benefit to a similar extent from THA.

LEVEL OF EVIDENCE:

Level III, therapeutic study.

PMID:

26224293

Impact on foot and ankle

[Knee Surg Sports Traumatol Arthrosc.](#) 2015 Nov 21. [Epub ahead of print]

Effects of total knee arthroplasty on ankle alignment in patients with varus gonarthrosis: Do we sacrifice ankle to the knee?

[Gursu S¹](#), [Sofu H²](#), [Verdonk P³](#), [Sahin V²](#).

[Author information](#)

Abstract

PURPOSE:

Total knee arthroplasty is one of the most commonly preferred surgical methods in the treatment of patients with varus gonarthrosis. In this study, we aimed to evaluate the radiological changes observed in the ankles after total knee arthroplasty.

METHODS:

Between May 2012 and June 2013, 80 knees of 78 patients with varus deformity over 10° underwent total knee arthroplasty. For each patient, full-leg standing radiographs were obtained pre- and post-operatively. Mechanical and anatomical axes (HKA and AA), lateral distal femoral angle, medial proximal tibial angle, lateral distal tibial angle (LDTA), ankle joint line orientation angle (AJOA), tibial plafond talus angle (PTA) and talar shift were measured for each patient both pre- and post-operatively.

RESULTS:

Pre-operatively, the mean HKA was 16.6° and the mean AA was 10.41°, both in favour of varus alignment. Post-operatively, the mean HKA decreased to 3.6° and the mean AA to -2.1. The mean LDTA was 87.3°. Before the operation, the mean AJOA was -7.6°, opening to the medial aspect of the ankle, and it was 0.04° after the operation and opening to the lateral aspect ($p < 0.05$).

CONCLUSION:

Our study reveals the changes occurring in the ankle after acute correction of long-standing varus deformity of the knee using total knee arthroplasty. In cases undergoing knee arthroplasty, effect of the acute change in the alignment of the knee on the ankle should be taken into consideration and the amount of correction should be calculated carefully in order not to damage the alignment of the ankle.

LEVEL OF EVIDENCE:

IV.

KEYWORDS:

Alignment; Ankle; Arthroplasty; Knee; Varus gonarthrosis

PMID:

26590564

29. OA

30 A. IMPINGEMENT

30 B. LABRUM

Repairs

[Knee Surg Sports Traumatol Arthrosc.](#) 2015 Nov 14. [Epub ahead of print]

Evaluation of the sealing function of the acetabular labrum: an in vitro biomechanical study.

[Signorelli C](#)¹, [Bonanzinga T](#)^{2,3}, [Lopomo N](#)^{2,4}, [Zaffagnini S](#)^{2,3}, [Marcacci M](#)^{2,3}, [Safran M](#)⁵.

[Author information](#)

Abstract

PURPOSE:

To quantitatively evaluate the biomechanical sealing function of an intact labrum and the effect of labral-chondral separation, cerclage suture labral repair, vertical mattress suture repair and partial labrectomy on distraction load and hip joint centre (HJC) displacement.

METHODS:

Eight fresh-frozen cadaveric hips were tested using a navigation system for intra-operative kinematic analysis. A six-axis load cell was used to measure the manually applied force when performing the tests: hip pivoting movement and distraction. The HJC displacement that occurred during the distraction test has been evaluated in correspondence of seven different values of applied force. During the pivoting motion, the maximum value of HJC displacement was

evaluated. Five different conditions were tested: labrum intact, labral-chondral separation, vertical mattress suture repair, cerclage suture repair, and partial labrectomy.

RESULTS:

With regard to HJC displacement using at fixed value of force, the paired sample t test underscored the statistically significant differences ($p < 0.05$) for each of the five tested conditions among themselves. Only the comparison of intact versus labral-chondral separation was not significantly different. During pivoting motion, a statistically significantly greater displacement was identified after labrectomy when compared with the cerclage suture repair ($p = 0.03$) and vertical mattress repair ($p < 0.01$) in medial-lateral direction. Along proximal-distal direction, a significant lower displacement after labrectomy was identified when compared to the cerclage suture repair ($p = 0.03$). Performing the pivoting motion at the extreme ranges of motion demonstrated a higher value of displacement after labrectomy when compared with all the previously tested conditions.

CONCLUSIONS:

These results suggest that labral repair is important in the function of the hip and that the vertical mattress suture technique may be better than the cerclage suture repair.

KEYWORDS:

Controlled load; HJC displacement; Labral repair; Labral–chondral separation; Labrectomy

PMID:

2657263

31. KNEE

32 A. KNEE/ACL

Knee Valgus during vertical jump

[J Orthop Sports Phys Ther.](#) 2015 Sep 17:1-26. [Epub ahead of print]

Association Between Anatomical Characteristics, Knee Laxity and Muscle Strength, and Peak Knee Valgus During Vertical Drop Jump Landings.

[Nilstad A¹](#), [Krosshaug T](#), [Mok KM](#), [Bahr R](#), [Andersen TE](#).

[Author information](#)

Abstract

Study Design Controlled laboratory study; cross-sectional. **Objectives** To investigate the relationship among anatomical variables, knee laxity, muscle strength, and peak knee valgus angles during a vertical drop jump landing task. **Background** Excessive knee valgus has been associated with anterior cruciate ligament (ACL) injury in females, however the influence of anatomical characteristics, knee laxity and muscle strength on frontal plane knee motion is not completely understood. **Methods** Norwegian elite female soccer players (N=209, age: 21 ± 4 years; height: 167 ± 6 cm; body mass: 63 ± 7 kg) were evaluated from 2009 through 2012. The evaluation included three-dimensional (3D) motion analysis of a vertical drop jump, anatomical measures (height, static knee valgus, leg length and static foot posture), knee laxity, and muscle strength (quadriceps, hamstrings and hip abductors). Multiple linear regression analyses were used to investigate the relationships among anatomical characteristics, knee laxity and muscle strength, and peak knee valgus angles. **Results** Anatomical characteristics explained 11% of the variance in peak knee valgus angles ($p < 0.001$), with height and static knee valgus being significant predictors. **Conclusion** Greater body height and static knee valgus were associated with greater peak knee valgus angles during a vertical drop jump landing task. However these

variables only explained 11% of the variance in peak knee valgus. J Orthop Sports Phys Ther, Epub 17 Sep 2015. doi:10.2519/jospt.2015.5612.

KEYWORDS:

anterior cruciate ligament; biomechanics; female; football; screening; soccer

PMID:

26381485

32 B. KNEE/PCL

33. MENISCUS

Tears

[Arthroscopy](#). 2015 Nov 18. pii: S0749-8063(15)00814-2. doi: 10.1016/j.arthro.2015.10.004. [Epub ahead of print]

Prevalence of Lateral Meniscal Extrusion for Posterior Lateral Meniscal Root Lesion With and Without Concomitant Midbody Radial Tear in Anterior Cruciate Ligament Injury.

[Shen JW](#)¹, [Song GY](#)¹, [Zhang H](#)¹, [Wang QQ](#)², [Zhang J](#)¹, [Li Y](#)¹, [Feng H](#)³.

[Author information](#)

Abstract

PURPOSE:

To investigate the prevalence of lateral meniscal extrusion for patients with posterior lateral meniscal root lesions (PLMRLs) and for those with concomitant midbody radial tears (MRTs) in anterior cruciate ligament (ACL) injuries.

METHODS:

A database of consecutive patients undergoing primary ACL reconstruction between 2011 and 2013 was retrospectively reviewed to identify patients with isolated ACL injuries and those with associated PLMRLs. Patients with (1) unavailable preoperative magnetic resonance imaging scans, (2) other concomitant ligamentous injuries, (3) severe degeneration or malalignment, (4) infection or tumor, or (5) history of surgery on the injured side were excluded. For patients with associated PLMRLs (study group), degree of concomitant MRTs and status of meniscofemoral ligaments (MFLs) were verified arthroscopically. Prevalence of lateral meniscal extrusion was compared between (1) patients in the study group and those with isolated ACL injuries and between (2) those with and without concomitant MRTs in the study group.

RESULTS:

Of the 1,021 consecutive patients, 412 met the inclusion and exclusion criteria. Of those, 52 (5.1%) had an associated PLMRL (study group) and another 52 were randomly chosen from the 360 isolated ACL injuries as the control group. In the study group, 33 (63.5%) were arthroscopically verified to have concomitant MRTs. Prevalence of lateral meniscal extrusion was significantly higher ($P < .0001$) in the study group (30.8%; 95% confidence interval [CI], 18.3 to 43.3) than in the control group (1.9%; 95% CI, -1.8 to 5.6), whereas there was no significant difference ($P = .758$) between patients with (33.3%; 95% CI, 17.3 to 49.3) and without (26.3%; 95% CI, 6.5 to 46.1) concomitant MRTs in the study group. However, the 7 patients who showed either complete concomitant MRTs or absence of MFLs were all diagnosed to have lateral meniscal extrusion.

CONCLUSIONS:

The PLMRLs, identified in 5.1% of ACL injuries, appeared to result in lateral meniscal extrusion. Although the presence of a concomitant MRT did not further increase the prevalence of lateral meniscal extrusion in the setting of a PLMRL, surgical repair might still be necessary if a complete concomitant MRT or an absence of MFL was identified to restore normal meniscal functions.

LEVEL OF EVIDENCE:

Level III, prognostic case-control study.

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PMID:

26603753

34. PATELLA

Replacement

[Knee Surg Sports Traumatol Arthrosc.](#) 2015 Nov 21. [Epub ahead of print]

Survivorship and functional outcomes of patellofemoral arthroplasty: a systematic review.

[van der List JP](#)¹, [Chawla H](#)², [Zuiderbaan HA](#)³, [Pearle AD](#)⁴.

[Author information](#)

Abstract

PURPOSE:

Historically poor results of survivorship and functional outcomes of patellofemoral arthroplasty (PFA) have been reported in the setting of isolated patellofemoral osteoarthritis. More recently, however, fairly good results of PFA were reported, but the current status of PFA outcomes is unknown. Therefore, a systematic review was performed to assess overall PFA survivorship and functional outcomes.

METHODS:

A search was performed using PubMed, Embase and Cochrane systems, and the registries were searched. Twenty-three cohort studies and one registry reported survivorship using Kaplan-Meier curve, while 51 cohort studies reported functional outcomes of PFA.

RESULTS:

Twelve studies were level II studies, while 45 studies were level III or IV studies. Heterogeneity was mainly seen in type of prosthesis and year the cohort started. Nine hundred revisions in 9619 PFAs were reported yielding 5-, 10-, 15- and 20-year PFA survivorships of 91.7, 83.3, 74.9 and 66.6 %, respectively, and an annual revision rate of 2.18. Functional outcomes were reported in 2587 PFAs with an overall score of 82.2 % of the maximum score. KSS and Knee Function Score were 87.5 and 81.6 %, respectively.

CONCLUSION:

This systematic review showed that fairly good results of PFA survivorship and functional outcomes were reported at short- and midterm follow-up in the setting of isolated patellofemoral osteoarthritis. Heterogeneity existed mainly in prosthesis design and year the cohort started.

CLINICAL RELEVANCE:

These results provide a clear overview of the current status of PFA in the setting of isolated patellofemoral osteoarthritis.

LEVEL OF EVIDENCE:

IV.

KEYWORDS:

Functional outcomes; Isolated patellofemoral osteoarthritis; PFA; Patellofemoral arthroplasty; Survivorship

PMID:

26590562

35. KNEE/TOTAL

Guided motor imagery

[Orthop Nurs](#). 2015 Nov-Dec;34(6):356-64. doi: 10.1097/NOR.000000000000193.

Acceptability of a Guided Imagery Intervention for Persons Undergoing a Total Knee Replacement.

[Draucker CB](#)¹, [Jacobson AE](#), [Umberger WA](#), [Myerscough RP](#), [Sanata JD](#).

[Author information](#)

Abstract

BACKGROUND:

Guided imagery (GI) has been recommended as a mind-body therapy for pain relief following orthopaedic surgery, but little is known about the acceptability of the intervention.

PURPOSE:

Describe the perceptions of patients undergoing total knee replacement (TKR) surgery regarding the acceptability of a customized GI intervention to promote TKR outcomes.

METHODS:

Narrative and survey data collected during a randomized controlled trial of the GI intervention were analyzed to assess the acceptability of the intervention.

RESULTS:

Most participants were satisfied with and actively engaged in the intervention, and they perceived it to be helpful. For the smaller group of participants who did not find the intervention to be acceptable, reasons for dissatisfaction and barriers to engagement were identified.

CONCLUSIONS:

Guided imagery is an acceptable intervention for many persons undergoing TKR surgery. The results of this study can provide information to further develop a targeted and customized GI intervention for this population.

PMID:

26575508

36. KNEE/EXERCISE

37. OSTEOARTHRITIS/KNEE

Glucosamine

Efficacy and Safety of Glucosamine Sulfate in the Management of Osteoarthritis: Evidence from Real-Life Setting Trials and Surveys

Olivier Bruyère, PhD Roy D. Altman, MD Jean-Yves Reginster, MD, PhD

DOI: <http://dx.doi.org/10.1016/j.semarthrit.2015.11.011>

The European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO) treatment algorithm recommends chronic symptomatic slow-acting drugs for osteoarthritis (SYSADOAs) including glucosamine sulfate (GS) and chondroitin sulfate (CS) as first-line therapy for knee osteoarthritis (OA). Numerous studies are published on the use of SYSADOAs in OA; however, the efficacy of this class is still called into question largely due to the regulatory status, labeling and availability of these medications differ substantially across the world. Examination of the evidence for the prescription patented crystalline GS (pCGS) formulation at a dose of 1500 mg once-daily demonstrates superiority over other GS and glucosamine hydrochloride (GH) formulations and dosage regimens. Thus, the ESCEO task force advocates differentiation of prescription pCGS over other glucosamine preparations. Long-term clinical trials and real-life studies show that pCGS may delay joint structural changes, suggesting potential benefit beyond symptom control when used early in the management of knee OA. Real-life pharmaco-economic studies demonstrate a long-term reduction in the need for additional pain analgesia and non-steroidal anti-inflammatory drugs (NSAIDs) with pCGS, with a significant reduction of over 50% in costs associated with medications, healthcare consultations and examinations over 12 months. Furthermore, treatment with pCGS for at least 12 months leads to a reduction in the need for total joint replacement for at least 5 years following treatment cessation. Thus, pCGS (1500 mg od) is a logical choice to maximize clinical benefit in OA patients, with demonstrated medium-term control of pain and lasting impact on disease progression.

Abbreviations:

CS (chondroitin 4&6 sulfate), GH (glucosamine hydrochloride), GS (glucosamine sulfate), pCGS (patented crystalline glucosamine sulfate), SYSADOAs (symptomatic slow-acting drugs for osteoarthritis)

Hyaluronic acid

[J Orthop Traumatol](#). 2015 Nov 14. [Epub ahead of print]

Effectiveness of intra-articular injections of sodium hyaluronate-chondroitin sulfate in knee osteoarthritis: a multicenter prospective study.

[Rivera F](#)^{1,2}, [Bertignone L](#)^{3,4}, [Grandi G](#)⁵, [Camisassa R](#)⁵, [Comaschi G](#)⁶, [Trentini D](#)⁷, [Zanone M](#)⁸, [Teppex G](#)⁸, [Vasario G](#)⁸, [Fortina G](#)⁹.

[Author information](#)

Abstract

BACKGROUND:

Intra-articular injection of hyaluronic acid is a well-established therapy for the treatment of knee osteoarthritis. The aim of the study was to assess the effectiveness and safety of the use of Arthrum HCS® (40 mg hyaluronic acid and 40 mg chondroitin sulfate in 2 mL).

MATERIALS AND METHODS:

This was an open, multicenter, prospective study. Men or women over 40 years of age with documented knee osteoarthritis and WOMAC subscore A (severity of pain) ≥ 25 were enrolled. They received three weekly intra-articular injections of sodium hyaluronate 2 % and chondroitin sulfate 2 % in combination. WOMAC subscore A was assessed at 1, 3 and 6 months after the last injection.

RESULTS:

One hundred and twelve patients were included (women, 66 %). The mean (SD) WOMAC subscore A decreased from 52.1 (15.2) at inclusion to 20.5 (19.7) at month 6 ($P < 0.0001$). The mean subscore was already significantly decreased 1 month after the last injection at 25.7 ($P < 0.0001$). Pain relief and consumption of analgesic drugs, both assessed with visual analogic scale (VAS), consistently decreased. The investigators were satisfied/very satisfied as regards the therapeutic effectiveness of sodium hyaluronate-chondroitin sulfate in reducing pain (77 %), improving mobility (78 %) and reducing the consumption of analgesics (74 %). Only one adverse effect was reported by one patient (knee tumefaction).

CONCLUSION:

These results suggest that intra-articular injections of Arthrum HCS® (sodium hyaluronate plus chondroitin sulfate) in patients with knee osteoarthritis are efficient and safe. These results should be confirmed in a randomized controlled study.

LEVEL OF EVIDENCE:

IV.

KEYWORDS:

Chondroitin sulfate; Intra-articular injection; Knee osteoarthritis; Sodium hyaluronate

PMID:

26577936

38 A. FOOT AND ANKLE

38 B. FOOT TYPES

38 C. FOOT EXERCISE

39 A. ORTHOTICS

39 B. SHOES

[Impact of wearing high heels](#)

Does the use of high-heeled shoes lead to fore-foot pathology? A controlled cohort study comprising 197 women

[Grethe E. Borchgrevink](#)  

[Annja T. Viset](#)

[Eivind Witsø](#)

[Berit Schei](#)

[Olav A. Foss](#)

DOI: <http://dx.doi.org/10.1016/j.fas.2015.10.004>

Highlights

- Women wearing high-heeled shoes at work for 5 years or more were compared to controls.
- Investigated with radiographs, SEFAS questionnaire and AOFAS Clinical Rating System.
- Evaluators were blinded to group-affiliation.
- Wearing high-heeled shoes at work did not cause more foot deformation.
- Wearing high-heeled shoes at work caused more foot pain and callosities.

Abstract

Background

High-heeled shoes have been suggested as a main explanation for the female dominance in foot pain and deformities. Aim of study was to test this hypothesis scientifically.

Methods

Women 40–66 years were included in two groups. 95 women who had worn high-heeled shoes at work for at least 5 years were compared to 102 women who had never worn high-heeled shoes at work. The investigations were weight bearing radiographs of foot and ankle, the SEFAS questionnaire and the AOFAS Clinical Rating System. Evaluators were blinded to the group-affiliation.

Results

Radiographs showed no statistically significant differences between the two groups concerning deformities or joint disease. Foot function measured by SEFAS and AOFAS total score, were similar in the two groups. The high-heeled group had more pain and more callosities.

Conclusion

For women aged 40–66 years wearing of high-heeled shoes had not caused foot deformation, but more foot pain and callosities.

Keywords:

[Footwear](#), [High-heeled shoes](#), [Hallux valgus](#), [Foot deformities](#), [Foot pain](#)

40. ANKLE SPRAINS AND INSTABILITY**Sprain impacts activity**

J Sports Sci Med. 2015 Aug 11;14(3):556-61. eCollection 2015.

An Acute Lateral Ankle Sprain Significantly Decreases Physical Activity across the Lifespan.

[Hubbard-Turner T1](#), [Wikstrom EA1](#), [Guderian S2](#), [Turner MJ3](#).

Author information**Abstract**

We do not know the impact an ankle sprain has on physical activity levels across the lifespan. With the negative consequences of physical inactivity well established, understanding the effect of an ankle sprain on this outcome is critical. The objective of this study was to measure physical activity across the lifespan after a single ankle sprain in an animal model. Thirty male mice (CBA/J) were randomly placed into one of three groups: the transected calcaneofibular ligament (CFL) group, the transected anterior talofibular ligament (ATFL)/CFL group, and a SHAM group. Three days after surgery, all of the mice were individually housed in a cage containing a solid surface running wheel. Physical activity levels were recorded and averaged every week across the mouse's lifespan. The SHAM mice ran significantly more distance each day compared to the remaining two running groups (post hoc $p = 0.011$). Daily duration was different between the three running groups ($p = 0.048$). The SHAM mice ran significantly more minutes each day compared to the remaining two running groups (post hoc $p = 0.046$) while the ATFL/CFL mice ran significantly less minutes each day (post hoc $p = 0.028$) compared to both the SHAM and CFL only group. The SHAM mice ran at a faster daily speed versus the remaining two groups of mice (post hoc $p = 0.019$) and the ATFL/CFL mice ran significantly slower each day compared to the SHAM and CFL group (post hoc $p = 0.005$). The results of this study indicate that a single ankle sprain significantly decreases physical activity across the lifespan in mice. This decrease in physical activity can potentially lead to the development of numerous chronic diseases. An ankle sprain thus has the potential to lead to significant long term health risks if not treated appropriately. Key points A single ankle significantly decreased physical activity levels in mice across the lifespan. Decreased physical activity could significantly negatively impact overall

ABSTRACTS

health if not modified. Initial treatment and rehabilitation of ankle sprains needs to be studied to determine ways to keep physical activity levels up after injury.

KEYWORDS:

Ankle injury; exercise; mice; physical activity

Impact on hip

[Knee Surg Sports Traumatol Arthrosc.](#) 2015 Nov 14. [Epub ahead of print]

Single-leg drop landing movement strategies in participants with chronic ankle instability compared with lateral ankle sprain 'copers'.

[Doherty C](#)¹, [Bleakley C](#)², [Hertel J](#)³, [Caulfield B](#)⁴, [Ryan J](#)⁵, [Delahunt E](#)^{4,6}.

[Author information](#)

Abstract

PURPOSE:

To compare the movement patterns and underlying energetics of individuals with chronic ankle instability (CAI) to ankle sprain 'copers' during a landing task.

METHODS:

Twenty-eight (age 23.2 ± 4.9 years; body mass 75.5 ± 13.9 kg; height 1.7 ± 0.1 m) participants with CAI and 42 (age 22.7 ± 1.7 years; body mass 73.4 ± 11.3 kg; height 1.7 ± 0.1 m) ankle sprain 'copers' were evaluated 1 year after incurring a first-time lateral ankle sprain injury. Kinematics and kinetics of the hip, knee and ankle joints from 200 ms pre-initial contact (IC) to 200 ms post-IC, in addition to the vertical component of the landing ground reaction force, were acquired during performance of a drop land task.

RESULTS:

The CAI group adopted a position of increased hip flexion during the landing descent on their involved limb. This coincided with a reduced post-IC flexor pattern at the hip and increased overall hip joint stiffness compared to copers (-0.01 ± 0.05 vs 0.02 ± 0.05 °/Nm kg⁻¹, $p = 0.03$).

CONCLUSIONS:

Individuals with CAI display alterations in hip joint kinematics and energetics during a unipodal landing task compared to LAS 'copers'. These alterations may be responsible for the increased risk of injury experienced by individuals with CAI during landing manoeuvres. Thus, clinicians must recognise the potential for joints proximal to the affected ankle to contribute to impaired function following an acute lateral ankle sprain injury and to develop rehabilitation protocols accordingly.

LEVEL OF EVIDENCE:

Level III.

KEYWORDS:

Ankle joint; Biomechanics; Joint instability; Kinematics; Kinetics; Task performance and analysis

PMID: 26572632

41 A. ACHILLES TENDON AND CALF

T2

[J Magn Reson Imaging.](#) 2015 Nov 25. doi: 10.1002/jmri.25104. [Epub ahead of print]

T2 * relaxation time in Achilles tendinosis and controls and its correlation with clinical score.

[Gärden A](#)¹, [Rasinski P](#)¹, [Berglund J](#)², [Shalabi A](#)^{1,3}, [Schulte H](#)⁴, [Brismar TB](#)¹.

[Author information](#)

Abstract

PURPOSE:

To investigate if the T_2^* of Achilles tendons can discriminate between chronic Achilles tendinosis and healthy controls; to correlate with clinical score; to evaluate its short-term repeatability; and to estimate minimal detectable change.

MATERIALS AND METHODS:

Twenty patients, with chronic mid-portion Achilles tendinosis, and 10 controls without history of Achilles tendon symptoms, were examined with a 3T MR scanner with a 3D flash ultrashort time to echo sequence with five different echo times. The sequence was run twice to test repeatability. The tendon border was delineated on axial slices at three different levels in the calculated T_2^* maps. The clinical severity of Achilles tendinosis was measured by a VISA-A questionnaire.

RESULTS:

There was a significant difference in mean T_2^* between symptomatic and control tendons ($P < 0.001$). In patients with unilateral symptoms no significant difference in T_2^* was found between symptomatic and contralateral asymptomatic tendons ($P = 0.19$). There was no significant correlation between clinical severity and T_2^* ($r = -0.28$, $P = 0.22$). The short-term repeatability of T_2^* showed a coefficient of variation of 18%, a least significant change of 50%, and the intraclass correlation coefficient had an average consistency of 0.99.

CONCLUSION:

T_2^* may help to differentiate between chronic Achilles tendinosis and healthy controls but was not associated with the clinical score. However, and notably, the reproducibility of the method was low and the number of patients was small. *J. Magn. Reson. Imaging* 2015.

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KEYWORDS:

Achilles tendon; MRI; T_2^* relaxation time; VISA-A; tendinopathy

PMID:

26605756

41 B. COMPARTMENT SYNDROME**42. PLANTAR SURFACE****43. HALLUX VALGUS****Return to sports**

[Foot Ankle Int.](#) 2015 Nov 17. pii: 1071100715617750. [Epub ahead of print]

Return to Sports and Physical Activities After the Modified Lapidus Procedure for Hallux Valgus in Young Patients.

[MacMahon A](#)¹, [Karbassi J](#)¹, [Burket JC](#)², [Elliott AJ](#)¹, [Levine DS](#)¹, [Roberts MM](#)¹, [Deland JT](#)¹, [O'Malley MJ](#)¹, [Yu J](#)¹, [Mancuso CA](#)³, [Ellis SJ](#)⁴.

Author information

Abstract

BACKGROUND:

The modified Lapidus procedure has successfully relieved pain and corrected deformity in patients with hallux valgus, but its effect on participation in specific sports and physical activities remains unclear. Our goals were to assess sports and physical activities in young patients following the modified Lapidus procedure and to compare these with clinical outcomes.

METHODS:

Fifty-eight eligible patients were identified from a retrospective registry review. Of these, 48 (83%) were reached for follow-up at a mean of 2.8 (range, 1.0 to 6.1) years and had a mean age at surgery of 37.3 (range, 14.1 to 49.3) years. Physical activity participation was evaluated with a new sports-specific, patient-administered questionnaire. Clinical outcomes were evaluated with the Foot and Ankle Outcome Score (FAOS) and compared to sports outcomes.

RESULTS:

Patients participated in 26 different physical activities, consisting of 212 total physical activities preoperatively and 209 total postoperatively. The most common were walking, running, bicycling, and swimming. Compared to preoperatively, patients rated 29% of activities as less difficult, 52% as the same, and 19% as more difficult and rated participation levels as improved in 40%, the same in 41%, and impaired in 19%. Eighty-one percent of patients were satisfied with their operative outcome in regard to return to physical activity. Changes in the FAOS Pain subscore were significantly associated with improvements in physical activity difficulty ($P < .05$), and changes in the Pain, Sports, and QOL subscores were significantly associated with changes in physical activity participation levels ($P < .05$).

CONCLUSION:

Four in 5 patients were able to participate in previous sports and physical activities, including high-impact activities, at their preoperative participation level or better after the modified Lapidus procedure, and were satisfied with surgery in regard to return to previous activity. However, several patients had increased difficulty and impaired participation in physical activity postoperatively. Altogether, this suggests that the procedure is a viable treatment option for hallux valgus in young, active patients.

LEVEL OF EVIDENCE:

Level IV, retrospective case series.

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KEYWORDS:

Lapidus procedure; hallux disorders; hallux valgus; outcome studies; physical activity; sports

PMID:

26578481

Adductus

[Foot Ankle Int.](#) 2015 Nov 13. pii: 1071100715608372. [Epub ahead of print]

Radiographic Recurrence of Deformity After Hallux Valgus Surgery in Patients With Metatarsus Adductus.

[Aiyer A](#)¹, [Shub J](#)², [Shariff R](#)², [Ying L](#)², [Myerson M](#)².

[Author information](#)

Abstract

BACKGROUND:

Metatarsus adductus (MA) is a congenital condition that may lead to the development of hallux valgus (HV). The associated anatomic deformities may lead to recurrence of the HV in patients with MA. The goals of the study were to identify radiographic rates of recurrence of HV following surgery for HV in patients with MA.

METHODS:

Between 2002 and 2013, 587 patients who underwent HV surgery were retrospectively identified. The radiographic parameters recorded included the hallux valgus angle (HVA), the intermetatarsal angle (IMA), and the metatarsus adductus angle (MAA) obtained from initial radiographs and at final follow-up. The MAA was considered abnormal if the value was greater than 20 degrees. Radiographic recurrence was defined as HV deformity >20 degrees.

RESULTS:

The rate of radiographic recurrence of HV was 15% in patients without MA and 29.6% in patients with MA ($P < .05$). In the group with MA, rate of deformity recurrence did not differ among the operative procedures performed (Lapidus, 28.5%; distal first metatarsal osteotomy, 29.4%; proximal first metatarsal osteotomy, 28.9%). Patients with severe MA (MAA > 31 degrees) were found to have a recurrence rate of 18%, whereas those with less severe MA (MAA < 31 degrees) were found to have a recurrence rate of 82%. Of the patients with severe MA who did not have radiographic recurrence of HV, 60% had undergone a Lapidus arthrodesis and realignment arthrodesis of the second/third tarsometatarsal joints.

CONCLUSION:

The rate of radiographic recurrence for patients with MA undergoing HV correction was ~30%. This finding was consistent with our hypothesis that MA increases the risk of radiographic recurrence of HV deformity irrespective of the procedure performed. We believe the lower rate of recurrence of HV among patients with severe MA deformities is suggestive that more complete management of the deformity is warranted.

LEVEL OF EVIDENCE:

Level III, retrospective comparative series.

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KEYWORDS:

hallux valgus; metatarsus adductus; recurrence

PMID:

26567168

44. RHUMATOID ARTHRITIS

45 A. MANUAL THERAPY LUMBAR & GENERAL

45 B. MANUAL THERAPY CERVICAL

45 C. MANUAL THERAPY THORACIC

45 D. MANUAL THERAPY EXTREMITIES

Ankle traction

[J Sport Rehabil](#). 2015 Nov 11. [Epub ahead of print]

The Effect of Two Forms of Talocrural Joint Traction on Dorsiflexion Range of Motion and Postural Control in Those With Chronic Ankle Instability.

[Powden CJ](#)¹, [Hogan KK](#), [Wikstrom EA](#), [Hoch MC](#).

[Author information](#)

Abstract

CONTEXT:

Talocrural joint mobilizations are commonly used to address deficits associated with chronic ankle instability (CAI).

OBJECTIVE:

Examine the immediate effects of talocrural joint traction in those with CAI.

DESIGN:

Blinded, crossover.

SETTING:

Laboratory.

PARTICIPANTS:

Twenty adults (14 females; age=23.80±4.02years; height=169.55±12.38cm; weight=78.34±16.32kg) with self-reported CAI participated. Inclusion criteria consisted of a history of ≥1 ankle sprain, ≥2 episodes of giving way in the previous three months, answering "yes" to ≥4 questions on the Ankle Instability Instrument, and ≤24 on the Cumberland Ankle Instability Tool.

INTERVENTION:

Subjects participated in three sessions in which they received a single treatment session of sustained traction (ST), oscillatory traction (OT) or a sham condition in a randomized order. Interventions consisted of four, 30 seconds sets of traction with a minute of rest between sets. During ST and OT, the talus was distracted distally from the ankle mortise to the end-range of accessory motion. ST consisted of continuous distraction and OT involved 1-second oscillations between the mid and end-range of accessory motion. The sham condition consisted of physical contact without force application. Pre and post-intervention measurements of weight-bearing dorsiflexion, dynamic balance, and static single-limb balance were collected.

MAIN OUTCOME MEASURES:

The independent variable was treatment (ST, OT, sham). The dependent variables included pre-to-post-treatment change scores for the WBLT (cm), normalized SEBT-AR (%) and time-to-boundary (TTB) variables (s). Separate one-way ANOVAs examined differences between treatments for each dependent variable. Alpha was set a-priori at p<0.05.

RESULTS:

No significant treatment effects were identified for any variables.

CONCLUSION:

A single intervention of ST or OT did not produce significant changes in weight-bearing dorsiflexion range of motion or postural control in individuals with CAI. Future research should investigate the effects of repeated talocrural traction treatments and the effects of this technique when combined with other manual therapies.

PMID:

26562465

46 A. UPPER LIMB NEUROMOBILIZATION

46 B. LOWER LIMB NEUROMOBILIZATION

Double crush

[Spine J.](#) 2015 Nov 16. pii: S1529-9430(15)01650-2. doi: 10.1016/j.spinee.2015.11.003. [Epub ahead of print]

The diagnosis of double-crush lesion in the L5 lumbar nerve using diffusion tensor imaging.

[Kanamoto H¹](#), [Eguchi Y²](#), [Suzuki M³](#), [Oikawa Y⁴](#), [Yamanaka H³](#), [Tamai H³](#), [Kobayashi T³](#), [Orita S¹](#), [Yamauchi K¹](#), [Suzuki M¹](#), [Aoki Y⁵](#), [Watanabe A⁵](#), [Takahashi K¹](#), [Ohtori S¹](#).

[Author information](#)

Abstract

BACKGROUND CONTEXT:

Double-crush lesions are a condition in which the lumbar nerve is compressed both medially and laterally in the spinal canal, where diagnosis can be very difficult, and are a factor leading to poor surgical success rates.

PURPOSE:

Diffusion Tensor Imaging (DTI) was used to determine DTI parameter fractional anisotropy (FA) values and apparent diffusion coefficient (ADC) in both intraspinal column lesions alone and double-crush lesions.

STUDY DESIGN:

Prospective study PATIENT SAMPLE.: Of the 56 cases (mean age: 72.2 years) that underwent laminectomy for lumbar spinal stenosis at our clinic between April 2013 to March, 2015, 10 cases with L5 radiculopathy due to L4/5 stenosis (Intraspinal stenosis group (Group I); mean age: 74.7 years), and 5 cases with persistent symptoms due to L5 foraminal stenosis despite L4/5 decompression surgery (Double crush Group (Group D); mean age: 77.6 years) were targeted. One patient in Group D was diagnosed through microendoscopic intrapedicular partial pediculotomy, and the remaining 4 cases by nerve root infiltration. Five healthy cases (mean age: 54 years) were studied as controls.

OUTCOME MEASURES:

Intraspinal zone (Iz), nerve root (N), and extraforaminal zone (Ez) were established as the ROI, and the L5 nerve FA and ADC values were determined on the affected side.

METHODS:

DTI was performed prospectively by 1.5T MRI before surgery and DTI parameters of L5 nerve were evaluated in all patients and healthy volunteers. Student's t-test was used for group comparisons, and a $p < 0.05$ was considered statistically significant.

RESULTS:

FA values (Iz, N, Ez) were 0.415, 0.448, and 0.517, increasing as sites became more distal. Group I values were 0.335, 0.393, and 0.484, and Group D values were 0.296, 0.367, and 0.360. Compared to the healthy volunteers, Group D had significantly lower Iz ($p < 0.05$) and Ez ($p < 0.001$) values, while Group I had significantly lower Iz ($p < 0.05$) values. In Group D, Ez FA values were significantly lower ($p < 0.001$) than in Group I. ADC values (Iz, N, Ez) in the healthy control group were 1.270 mm²/s, 1.151 mm²/s, and 0.937 mm²/s with values decreasing as sites grew distal. In Group I, the ADC values were 1.406 mm²/s, 1.184 mm²/s, and 1.001 mm²/s, while in Group D they were 1.551 mm²/s, 1.412 mm²/s, and 1.329 mm²/s. Iz ($p < 0.05$) and Ez ($p < 0.05$) values were significantly higher in Group D compared to the healthy volunteers. N ($P < 0.01$) and Ez ($p < 0.001$) ADC values were significantly higher in Group D than in Group I.

CONCLUSIONS:

Depending on where the nerve was compressed, changes in DTI parameters revealed nerve damage (low FA values, and increased ADC) in the intraspinal canal in the Intraspinal Group, and over a widespread area in the Double-crush Group spanning the medial to lateral spinal canal. Our research suggests that in cases where double-crush is suspected before surgery, failed back surgery syndrome may be prevented by evaluating DTI images.

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KEYWORDS:

Double-crush lesion; apparent diffusion coefficient; diffusion tensor imaging; fractional anisotropy; lumbar foraminal stenosis

PMID:

26592484

47. STRETCHING/MUSCLES

Muscle strains

Br J Sports Med. 2015 Oct 30. pii: bjsports-2015-095136. doi: 10.1136/bjsports-2015-095136. [Epub ahead of print]

'Serious thigh muscle strains': beware the intramuscular tendon which plays an important role in difficult hamstring and quadriceps muscle strains.

Brukner P1, Connell D2.

Author information

Abstract

Why do some hamstring and quadriceps strains take much longer to repair than others? Which injuries are more prone to recurrence? Intramuscular tendon injuries have received little attention as an element in 'muscle strain'. In thigh muscles, such as rectus femoris and biceps femoris, the attached tendon extends for a significant distance within the muscle belly. While the pathology of most muscle injuries occurs at a musculotendinous junction, at first glance the athlete appears to

report pain within a muscle belly. In addition to the musculotendinous injury being a site of pathology, the intramuscular tendon itself is occasionally injured. These injuries have a variety of appearances on MRIs. There is some evidence that these injuries require a prolonged rehabilitation time and may have higher recurrence rates. Therefore, it is important to recognise the tendon component of a thigh 'muscle strain'.

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KEYWORDS:

Hamstring; Injuries; Muscle; Quadriceps

48 A. STM

Visceral STM helpful

CASE REPORT

Soft Tissue Mobilization to Resolve Chronic Pain and Dysfunction Associated With Postoperative Abdominal and Pelvic Adhesions: A Case Report

Authors: [Yui Y. Wong, PT, DPT, OCS¹](#), [Ryan W. Smith, PT, DPT²](#), [Shane Koppenhaver, PT, PhD, OCS, FAAOMPT³](#)

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Published: *Journal of Orthopaedic & Sports Physical Therapy*, 2015 **Volume:**45 **Issue:**12 **Pages:**1006–1016 **DOI:** 10.2519/jospt.2015.5766

Study Design

Case report.

Background

Common complications from abdominal and pelvic surgery include adhesions and chronic pain. Laparoscopic adhesiolysis is sometimes used to reduce adhesions and related pain. Physical therapy interventions, such as soft tissue mobilization (STM), may be used for this condition; however, evidence to support its effectiveness is lacking.

Case Description

A 28-year-old woman with a history of 5 abdominal/pelvic surgeries presented with right-sided lower abdominal and anterior hip pain, which had been present since she had undergone a laparoscopic appendectomy with a right ovarian cystectomy surgery 1 year earlier. As an active-duty member in the US Navy, due to pain and weakness, she was unable to perform required curl-ups for her fitness test. Though she had been previously treated both surgically with laparoscopic adhesiolysis and nonsurgically with physical therapy consisting of stretching and strengthening exercises, her pain and function did not improve. She was again evaluated and treated with physical therapy and, based on the examination findings, STM was used to address her pain and dysfunction, which were thought to be related to intra-abdominal adhesions.

Outcomes

Following 5 sessions of physical therapy over a 3-week period that included STM and therapeutic exercises, followed by 5 additional sessions over a 4-week period that focused on therapeutic exercises, the patient reported substantially decreased pain, improved function, and a full return to previous level of activity, including unrestricted physical training in a military setting.

Discussion

The outcomes for this patient suggest that STM may be effective as a conservative treatment option for pain and dysfunction related to intra-abdominal adhesions from abdominal/pelvic surgery. Studies with a higher level of evidence, including potential comparison between STM and traditional laparoscopic adhesiolysis, are needed to further determine benefits of nonsurgical care for this condition.

Level of Evidence

Therapy, level 4. *J Orthop Sports Phys Ther* 2015;45(12):1006–1016. Epub 15 Oct 2015. doi:10.2519/jospt.2015.5766

Keyword: [abdomen](#), [adhesiolysis](#), [manual therapy](#), [postoperative scar](#)

Post ACL biomechanics

[J Orthop Sports Phys Ther.](#) 2015 Oct 15:1-32. [Epub ahead of print]

Effects of Neuromuscular Fatigue on Quadriceps Strength and Activation and Knee Biomechanics in Individuals Post Anterior Cruciate Ligament Reconstruction and Healthy Adults.

[Thomas AC](#)¹, [Lepley LK](#), [Wojtys EM](#), [McLean SG](#), [Palmieri-Smith RM](#).

[Author information](#)

Abstract

Study Design Laboratory based experiment using a pre/post-test design. Objectives To determine the effects of neuromuscular fatigue on quadriceps strength and activation and sagittal and frontal plane knee biomechanics during dynamic landing following anterior cruciate ligament reconstruction (ACLR). Background Impaired quadriceps central activation occurs post-ACLR, likely altering lower extremity biomechanics. Neuromuscular fatigue similarly reduces volitional muscle activation and impairs neuromuscular control. Upon return to full activity post-ACLR, individuals likely concurrently experience quadriceps central activation deficits and neuromuscular fatigue, though the effects of fatigue on muscle strength and activation and biomechanics post-ACLR are unknown. Methods Seventeen individuals 7-10 months post-ACLR and 16 controls participated. Quadriceps strength and central activation ratio were recorded pre-/post-fatigue, which was induced via sets of double-leg squats. Knee biomechanics were recorded during a dynamic landing activity pre-/post-fatigue. Results Both groups demonstrated smaller knee flexion (initial contact:P=.017; peak:P=.004) and abduction (initial contact:P=.005; peak:P=.009) angles post-fatigue. The ACLr group had smaller peak knee flexion angles (P<.001) pre- and post-fatigue than controls. Knee flexion moment was smaller in ACLr than controls pre- (P<.001), but not post-fatigue (P=.103). Controls had smaller knee flexion moments post-fatigue (P=.001). Knee abduction moment was smaller in both groups post-fatigue (P=.003). All participants demonstrated significantly lower strength (P<.001) and activation (P=.003) post-fatigue. Conclusion Impaired strength, central activation, and biomechanics presented post-fatigue in both groups, confirming that neuromuscular fatigue may increase non-contact ACL injury risk. However, these changes were not exaggerated in ACLr participants, likely because they already demonstrated a stiff-legged landing strategy pre-fatigue. *J Orthop Sports Phys Ther*, Epub 15 Oct 2015. doi:10.2519/jospt.2015.5785.

KEYWORDS:

ACL; muscle inhibition; quadriceps weakness; return to play

PMID:

26471851

48 B. TRIGGER POINTS NEEDLING/ACUPUNCTURE

48 C. MUSCLES

49. STRETCHING

50 A. MOTOR CONTROL

50 B. PNF

51. CFS/BET

52. EXERCISE

53. CORE

Antigravity

[Eur Spine J.](#) 2015 Nov 18. [Epub ahead of print]

Changes in multifidus and abdominal muscle size in response to microgravity: possible implications for low back pain research.

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[Author information](#)

Abstract

PURPOSE:

In microgravity, muscle atrophy occurs in the intrinsic muscles of the spine, with changes also observed in the abdominal muscles. Exercises are undertaken on the International Space Station and on Earth following space flight to remediate these effects. Similar effects have been seen on Earth in prolonged bed rest studies and in people with low back pain (LBP). The aim of this case report was to examine the effects of microgravity, exercise in microgravity and post-flight rehabilitation on the size of the multifidus and antero-lateral abdominal muscles.

METHODS:

Ultrasound imaging was used to assess size of the multifidus, transversus abdominis and internal oblique muscles at four time points: pre-flight and after daily rehabilitation on day one (R + 1), day 8 (R + 8) and day 14 (R + 14) after return to Earth (following 6 months in microgravity).

RESULTS:

Exercises in microgravity maintained multifidus size at L2-L4, however, after spaceflight, size of the multifidus muscle at L5 was reduced, size of the internal oblique muscle was increased and size of transversus abdominis was reduced. Rehabilitation post-space flight resulted in hypertrophy of the multifidus muscle to pre-mission size at the L5 vertebral level and restoration of antero-lateral abdominal muscle size.

CONCLUSIONS:

Exercise in space can prevent loss of spinal intrinsic muscle size. For the multifidus muscles, effectiveness varied at different levels of the spine. Post-mission rehabilitation targeting specific

motor control restored muscle balance between the antero-lateral abdominal and multifidus muscles, similar to results from intervention trials for people with LBP. A limitation of the current investigation is that only one astronaut was studied, however, the microgravity model could be valuable as predictable effects on trunk muscles can be induced and interventions evaluated. Level of Evidence Case series.

KEYWORDS:

Exercise therapy; Lumbar spine; Paraspinal muscles; Rehabilitation; Trunk muscles; Ultrasound imaging

PMID:

26582165

54. POSTURE

55. SCOLIOSIS

56. ATHLETICS

57. GAIT

Impingement changes

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Hip joint biomechanics during gait in people with and without symptomatic femoroacetabular impingement.

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Author information

Abstract

Femoroacetabular impingement (FAI) is a morphological hip condition that can cause hip/groin pain and impaired function in younger active adults, and may lead to stiffness, muscle weakness, structural damage, and hip osteoarthritis. Understanding the impairments associated with FAI is crucial to guide treatment and rehabilitation strategies. Evidence is limited and conflicting about whether hip biomechanics are impaired during walking in people with symptomatic FAI. The objective of this study was to determine whether kinematics and kinetics during gait differ between people with symptomatic FAI and control participants. Fifteen participants diagnosed with symptomatic cam-type or combined (cam plus pincer) FAI who were scheduled for arthroscopic surgery and 14 age-, and sex-matched disease-free controls underwent three-dimensional gait analysis. Tri-planar hip kinematics and kinetics were compared between the two groups. There were limited significant between-group differences with respect to spatiotemporal variables. Participants with FAI walked with less range of motion in the sagittal plane during a gait cycle, but did not exhibit any significant kinematic differences in the frontal or transverse planes. There were no systematic differences in kinetics between the groups in any plane. Findings suggest that individuals with symptomatic FAI have minimal impairments in gait biomechanics. Although these individuals demonstrate reduced hip joint motion in the sagittal

plane, the size of the difference is small and its significance for symptoms and function is unclear. More pronounced deficits in hip kinetics and kinematics may be evident during functional tasks that challenge the hip towards the position of impingement.

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KEYWORDS:

Biomechanics; Femoroacetabular impingement (FAI); Gait; Hip; Range of motion

58. RUNNING

IT band pain

[BMC Musculoskelet Disord.](#) 2015 Nov 16;16(1):356. doi: 10.1186/s12891-015-0808-7.

Biomechanical risk factors associated with iliotibial band syndrome in runners: a systematic review.

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[Author information](#)

Abstract

BACKGROUND:

Iliotibial band syndrome is the second most common running injury. A gradual increase in its occurrence has been noted over the past decade. This may be related to the increasing number of runners worldwide. Since the last systematic review, six additional papers have been published, providing an opportunity for this review to explore the previously identified proximal risk factors in more detail. The aim of this systematic review is thus to provide an up to date quantitative synthesis of the trunk, pelvis and lower limb biomechanical risk factors associated with iliotibial band syndrome in runners and to provide an algorithm for future research and clinical guidance.

METHODS:

An electronic search was conducted of literature published up until April 2015. The critical appraisal tool for quantitative studies was used to evaluate methodological quality of eligible studies. Forest plots displayed biomechanical findings, mean differences and confidence intervals. Level of evidence and clinical impact were evaluated for each risk factor. A meta-analysis was conducted where possible.

RESULT:

Thirteen studies were included (prospective (n = 1), cross-sectional (n = 12)). Overall the methodological score of the studies was moderate. Female shod runners who went onto developing iliotibial band syndrome presented with increased peak hip adduction and increased peak knee internal rotation during stance. Female shod runners with iliotibial band syndrome presented with increased: peak knee internal rotation and peak trunk ipsilateral during stance.

CONCLUSION:

Findings indicate new quantitative evidence about the biomechanical risk factors associated with iliotibial band syndrome in runners. Despite these findings, there are a number of limitations to this review including: the limited number of studies, small effect sizes and methodological shortcomings. This review has considered these shortcomings and has summarised the best available evidence to guide clinical decisions and plan future research on iliotibial band syndrome aetiology and risk.

PMID:

26573859

59. PAIN

60. COMPLEX REGIONAL PAIN

61. FIBROMYALGIA

Smoking and FM

[Pain Pract.](#) 2015 Nov 25. doi: 10.1111/papr.12402. [Epub ahead of print]

The Perception of Female Smokers with Fibromyalgia on the Effects of Smoking on Fibromyalgia Symptoms.

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Abstract

OBJECTIVE:

Smokers with fibromyalgia have greater pain intensity and function impairment compared to nonsmokers. Patients' perceptions of interactions between smoking and fibromyalgia symptoms have not been described. The primary aim of this study was to report the perceptions of female smokers with fibromyalgia on how smoking affects symptoms.

METHODS:

Forty-eight daily smokers with fibromyalgia enrolled in the Mayo Clinic Fibromyalgia Treatment Center completed the Fibromyalgia Impact Questionnaire, Fagerstrom Test for Nicotine Dependence, Patient Health Questionnaire-9, General Anxiety Disorder-7 and a Fibromyalgia Symptoms and Smoking Survey which queried how smoking directly affected fibromyalgia symptoms (eg, pain, tiredness/fatigue, stiffness, nervousness/anxiety, depression/blueness, irritability, concentration, and overall) or indirectly as a coping mechanism.

RESULTS:

The majority of subjects reported smoking had no direct effect on fibromyalgia physical symptoms (pain [60% reported no effect], fatigue [56%], stiffness [81%]) but direct improvement of emotional symptoms (anxiety [62% reported improvement], irritability [64%]). The majority of subjects used smoking to cope with pain (69%) via distraction (83%) and relaxation (77%), lessening emotional distress by reducing a sense of frustration (83%) or sadness (54%) because of pain, and as a justification for resting vis-à-vis "smoke breaks" (69%). Thirty-one smokers were mildly and 17 moderately/severely dependent on tobacco, and no difference in fibromyalgia impact score ($P = 0.70$), pain ($P = 0.39$), depression ($P = 0.20$), and anxiety ($P = 0.64$) scores were detected, but more moderately/severely dependent subjects reported smoking improved pain (50% vs. 17%, $P = 0.04$).

DISCUSSION:

Smokers with fibromyalgia reported smoking helped to cope with fibromyalgia pain but generally did not directly ameliorate fibromyalgia physical symptoms.

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KEYWORDS:

chronic pain; coping strategies; fibromyalgia; perception; tobacco use

PMID:

26603674

62 A. NUTRITION/VITAMINS

62 B. CRYOTHERAPY

63. PHARMACOLOGY

NSAID's and liver damage

[Liver Int.](#) 2015 Nov 25. doi: 10.1111/liv.13032. [Epub ahead of print]

Liver Injury from Nonsteroidal Anti-inflammatory Drugs in the United States.

[Schmeltzer PA](#)¹, [Kosinski AS](#)², [Kleiner DE](#)³, [Hoofnagle JH](#)³, [Stolz A](#)⁴, [Fontana RJ](#)⁵, [Russo MW](#)¹; [Drug-Induced Liver Injury Network \(DILIN\)](#).

[Author information](#)

Abstract

BACKGROUND:

Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly used and have been associated with hepatotoxicity. Studies of liver injury from NSAIDs have been retrospective and prospective data are lacking.

AIM:

To report the features and outcomes of subjects with severe drug induced liver injury from NSAIDs.

METHODS:

The U.S. Drug Induced Liver Injury Network is a prospective registry of idiosyncratic drug hepatotoxicity. All patients are evaluated in a standard fashion and followed for at least 6 months.

RESULTS:

Of 1,221 DILIN cases that were adjudicated, 30 cases were attributed to 8 different NSAIDs. The mean age was 52 years old, 24 (80%) were women, and 21 (70%) were Caucasian. The mean latency was 67 days. Common signs and symptoms at presentation were nausea (73%), jaundice (67%), and dark urine (67%). Mean peak serum AST, ALT, total bilirubin, and alkaline phosphatase were 898 U/L, 1060 U/L, 12.2 mg/dL, and 326 U/L. The most common pattern of injury was hepatocellular (70%) and autoantibodies were detected in 33% of cases. Diclofenac, was the most frequently implicated NSAID (16/30 cases), and characterized by hepatocellular injury. Seventeen cases resulted in hospitalization or prolongation of hospitalization and one patient died from complications of Stevens-Johnson syndrome due to diclofenac.

CONCLUSIONS:

Hepatocellular injury is the most common pattern seen with NSAID hepatotoxicity and diclofenac is the most frequently implicated agent. Given the number of NSAID alternatives, diclofenac should be reserved for patients who fail other NSAIDs and a high level of suspicion for hepatotoxicity should be maintained. This article is protected by copyright. All rights reserved.

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KEYWORDS:

Diclofenac; Hepatotoxicity; Medication; Nonsteroidal

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26601797

64. ELECTROTHERAPY

65. NEUROLOGICAL CONDITIONS