



PASIG **PERFORMING ARTS**
SPECIAL INTEREST GROUP



ORTHOPAEDIC SECTION
AMERICAN PHYSICAL THERAPY ASSOCIATION



PASIG MONTHLY CITATION BLAST: No. 117

July 2016

Dear Performing Arts SIG members:

Upcoming Conferences! We look forward to providing more programming at conferences in 2017. Upcoming events for the Orthopaedic Section is CSM 2017 on Feb 15-17 in San Antonio, TX. The 2017 annual conference will be San Diego Hyatt Regency mission bay April 20-22.

Dance Fellowship Update! The Description of Advanced Specialized Practice (DASP) for Performing Arts Physical Therapy was revalidated and approved by the ABPTRFE. This provides current practice guidelines for practitioners in the subspecialty field of Performing Arts Physical Therapy. It also provides the framework for competencies, skills, and attributes that a PT fellowship program should achieve for the subspecialty field. The ABPTRFE has already recognized one Performing Arts PT Fellowship program in development at Ohio State Sports Medicine. Several others are also in the early stages of planning and we hope for them to be developed soon. For questions please contact Mariah.Nierman@osumc.edu.

USC Research Survey! Please see the following research request from and help the researchers with their exciting dance injury screening tool research study:

We are a group of researchers from the University of Southern California, Division of Biokinesiology and Physical Therapy, working to develop a dance injury-screening tool. We would like to obtain the input of movement experts who work with individuals in the performing arts, or have been educated in the performing arts. Please take the time to watch a short video of a dancer performing a sauté de chat, and then complete the 10-minute survey.

You may watch the videos at the link as many times as you like. The results of the survey will be used to compile an observation form that will allow a physical therapist with basic physical therapy training and education, to study the kinematics of a specific dance movement, and be able to observe unique dancer-specific movement preferences that may eventually cause, or are currently causing, musculoskeletal impairments.

We thank you in advance for your input.

Link to videos:

<https://www.dropbox.com/sh/yxcg85znlhkyoqb/AAA2th0nVKELaoWmN7xk5F1Pa?dl=0>

Link to survey:

https://uscdentistry.az1.qualtrics.com/SE/?SID=SV_0p4YPk6Ad8EAQ4d

Attention all PASIG Members!! The PASIG Nomination Committee is looking for interested and qualified candidates interested in running for officer positions beginning 2017. There are 3 positions that will be up for election at the end of this year. These include: President (3 year term), Nominating committee member (3 year term), and Secretary (2 year term).

Job descriptions of each of these positions are available. If anyone is interested or would like to nominate someone for any of the positions, please e-mail Janice Ying (JaniceYingDPT@gmail.com).

Looking for new committee members! There is room for new committee members, and students are welcome to participate. Please refer to the list below for contact information.

Annette Karim, President	2014-2017	neoluvsonlyme@aol.com
Rosie Canizares, Vice President/Education Chair	2016-2019	Rcc4@duke.edu
Janice Ying, Nominating Committee Chair	2016-2017	JaniceYingDPT@gmail.com
Laura Reising, Research Chair	2016-2018	lbreising@gmail.com
Amanda Blackmon, Dancer Screen Chair	2016-2018	MandyDancePT@gmail.com
Dawn Muci, Public Relations Chair	2016-2018	Dawnd76@hotmail.com
Mariah Nierman, Fellowship Taskforce Chair	2016-2018	Mariah.Nierman@osumc.edu
Anna Saunders, Secretary/Student Scholarship Chair	2015-2017	annarosemary@gmail.com
Andrea N. Lasner, Nominating Committee	2015-2018	alasner1@jhmi.edu
Jessica Fulton, Nominating Committee	2016-2019	jessicafultoncpt@gmail.com
Laurel Abbruzzese, Fellowship Chair Asst.	2016-2018	La110@cumc.columbia.edu
Elizabeth Chesarek, Membership Chair	2016-2018	echesarek@gmail.com

Upcoming Courses:

Harkness Center for Dance Injuries at NYU Langone Medical Center presents:
GYROTONIC® METHODOLOGY FOR HEALTHCARE PROFESSIONALS
September 23 - 25, 2016

Location:

Fri., Sept. 23: Harkness Center for Dance Injuries at NYU Langone Medical Center,
New York, NY

Sat., Sept. 24 – Sun., Sept. 25: **GYROTONIC®** Manhasset, Manhasset, NY

Presenters:

Rita Renha, PT and **GYROTONIC®** Specialized Master Trainer

Marni Larkin, PT, OCS and **GYROTONIC®** Pre-Trainer

Marijeanne Liederbach, PhD, PT, ATC, CSCS, Director, Harkness Center for Dance Injuries

Description:

Professional dancers and athletes, including 2016 Wimbledon's Champion, Andy Murray, have long been using the **GYROTONIC®** Methodology as a tool for both performance enhancement and injury rehabilitation, but few healthcare professionals are aware of how powerfully this movement system compliments their goals to optimize patients' fitness and movement while balancing their bodies. In alignment with the American Physical Therapy Association's vision statement to "transform society by optimizing movement to improve the human experience," this practical, lab-based CEU course focuses on human movement demands by having participants explore how the Gyrotonic Methodology can help them improve their ability to recognize whole-body patterns in themselves and their patients and clients. Over two and a half days, participants will experientially understand a movement approach which integrates information from the neurologic, cardiorespiratory, and musculoskeletal systems to enrich their understanding of applied biomechanics.

Dress: comfortable athletic attire.

Learn more and register on [Eventbrite](#)

Limited to 15 participants

Looking for great residency and fellowship opportunities? See below:

The Harkness Center for Dance Injuries Residency Program is accepting applications for the 2016-2017 year! A WONDERFUL opportunity:

The NYU Langone Medical Center (NYULMC) Harkness Center for Dance Injuries is a clinical site for NYU Steinhardt School of Education's Orthopedic Physical Therapy Residency (ORP). The ORP is a 12-month program that provides the Resident with an intensive, individualized experience in orthopedic physical therapy and dance

medicine. The goal of the residency program, which follows the guidelines and accreditation standards of the American Physical Therapy Association (APTA), is to enable the Resident to develop the advanced clinical skills necessary to provide a superior level of patient care. Upon completion of the residency program, the Resident will have gained the knowledge and experience to be a competent advanced practitioner, and be qualified to sit for board certification in Orthopedics (OCS). Please note that all applicants must apply to New York University's Orthopedic Physical Therapy residency program and also be interviewed and accepted by the Harkness Center for Dance Injuries. Please visit <http://steinhardt.nyu.edu/pt/opt> and <http://hjd.med.nyu.edu/harkness/healthcare-professionals> for more information.

Interested in a Performing Arts Fellowship? The American Board of Physical Therapy Residency and Fellowship Education (ABPTFRE) has approved the PASIG Description of Specialist Practice (DSP) for the Performing arts as an area of study. We are now working with the ABPTFRE to turn the DSP into a Description of Fellowship Practice (DFP). We anticipate the DFP will be available online by June 2016. This means that sites can begin forming fellowships in dance medicine, music medicine, theater medicine, etc. The PASIG will provide the fellowship criteria for accreditation. We may have a meeting on creating a performing arts fellowship at CSM 2017 and/or the 2017 Orthopaedic Section annual meeting. Please contact Rosie Canizares, Mariah Nierman, and Laurel Abbruzzese if interested.

Membership: Current PASIG members, please remember to update your membership:
https://www.orthopt.org/login.php?forward_url=/surveys/membership_directory.php

Social Media: For fun PT info and related performing artists info...

- 1) Facebook page: (closed) so, if you would like to be a part of the group, email me on Facebook: Dawn Doran and let me know you'd like to join.
- 2) follow PASIG on Twitter: @PT4PERFORMERS

Call for case reports: If you have a brief, clinically-focused case report on a performing arts PT patient, or a clinical commentary, please contact Annette Karim to submit your writing for the next Orthopaedic Physical Therapy Practice Magazine: neoluvsonlyme@aol.com

WE NEED MORE CONTRIBUTORS TO OUR MONTHLY CITATION BLASTS!!!!
Past Monthly citation blasts are available, with citations and EndNote file, listed on the website:
http://www.orthopt.org/content/special_interest_groups/performing_arts/citations_endnotes

TOPICS THAT HAVE BEEN COVERED RECENTLY INCLUDE:

HVLAT for Lower Extremity Conditions (Current)

Inguinal Disruption

Femoroacetabular Impingement

Hand and Wrist Conditions in Gymnasts

Factors in Optimal Turnout

Achilles Tendinopathy

Biomechanics and Posture in Musicians

Pilates

ACL Injuries in Dancers

Patellofemoral Pain and Dance

Neural Entrapments Found Among Musicians

Stress Fractures of the Foot and Ankle

Dry Needling

Dynamic Warm Up and Stretching

Platelet Rich Plasma Injections

Back Pain in Dancers

If you are interested in contributing by writing a citation blast or joining the research committee, contact me at lbreising@gmail.com.

Sincerely,

Laura

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Sarah Edery-Altas, PT, DPT SEderyAltas@kessler-rehab.com (EndNote Organizer)

PERFORMING ARTS CONTINUING EDUCATION, CONFERENCES, AND RESOURCES

Musician Health Series, Janice Ying, PT, DPT, OCS

Glendale Adventist Therapy and Wellness Center, Los Angeles area (Eagle Rock), CA

[http://www.musicianshealthcorner.com/
Healthy Musician Series - Overuse](http://www.musicianshealthcorner.com/Healthy%20Musician%20Series%20-%20Overuse)

Orthopaedic Section Independent Study Course. *20.3 Physical Therapy for the Performing Artist.*

Monographs are available for:

- Figure Skating (J. Flug, J. Schneider, E. Greenberg),
- Artistic Gymnastics (A. Hunter-Giordano, Pongetti-Angeletti, S. Voelker, TJ Manal),

and

- Instrumentalist Musicians (J. Dommerholt, B. Collier).

Contact: Orthopaedic Section at: www.orthopt.org

Orthopaedic Section-American Physical Therapy Association,
Performing Arts SIG

http://www.orthopt.org/content/special_interest_groups/performing_arts

Performing Arts Citations and Endnotes

http://www.orthopt.org/content/special_interest_groups/performing_arts/citations_endnotes

ADAM Center

<http://www.adamcenter.net/>

Publications:

<http://www.adamcenter.net/#!vstc0=publications>

Conference abstracts:

<http://www.adamcenter.net/#!vstc0=conferences>

Dance USA

<http://www.danceusa.org/>

Research resources:

<http://www.danceusa.org/researchresources>

Professional Dancer Annual Post-Hire Health Screen:

<http://www.danceusa.org/dancerhealth>

Dancer Wellness Project

<http://www.dancerwellnessproject.com/>

Becoming an affiliate:

<http://www.dancerwellnessproject.com/Information/BecomeAffiliate.aspx>

Harkness Center for Dance Injuries, Hospital for Joint Diseases

<http://hjd.med.nyu.edu/harkness/>

Continuing education:

<http://hjd.med.nyu.edu/harkness/education/healthcare-professionals/continuing-education-courses-cme-and-ceu>

Resource papers:

<http://hjd.med.nyu.edu/harkness/dance-medicine-resources/resource-papers-and-forms>

Links:

<http://hjd.med.nyu.edu/harkness/dance-medicine-resources/links>

Informative list of common dance injuries:

<http://hjd.med.nyu.edu/harkness/patients/common-dance-injuries>

Research publications:

<http://hjd.med.nyu.edu/harkness/research/research-publications>

International Association for Dance Medicine and Science (IADMS)

<http://www.iadms.org/>

Resource papers:

<http://www.iadms.org/displaycommon.cfm?an=1&subarticlenbr=186>

Links:

<http://www.iadms.org/displaycommon.cfm?an=5>

Medicine, arts medicine, and arts education organization links:

<http://www.iadms.org/displaycommon.cfm?an=1&subarticlenbr=5>

Publications:

<http://www.iadms.org/displaycommon.cfm?an=3>

Performing Arts Medicine Association (PAMA)

<http://www.artsmed.org/>

<http://www.artsmed.org/symposium.html>

Interactive bibliography site:

<http://www.artsmed.org/bibliography.html>

Related links:

<http://www.artsmed.org/relatedlinks.html>

Member publications:

<http://artsmed.org/publications.html>

(Educators, researchers, and clinicians, please continue to email your conference and continuing education information to include in future blasts.

HVLAT for the Lower Extremity Conditions

Physical therapists are allowed in many states to perform high velocity low amplitude thrust mobilizations (HVLAT); also called grade 5 mobilizations or thrust joint manipulation (TJM). The focus of these articles is on the effects of manipulation of the lower extremity or spine on balance, strength, pain, ROM and function. Also included are research articles investigating CPRs for those individuals that may benefit from an HVLAT. Evidence shows us that it is important to take a regional interdependence approach when treating patients; such as, considering a lumbar manipulation in an individual with PFPS and when to consider a cuboid whip in an athlete sent to physical therapy with ITB pain. However, more research is needed to

study the benefits of joint manipulation of the lower extremity and how this may benefit our performing arts population.

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Albuquerque-Sendín F, Fernández-de-las-Peñas C, Santos-del-Rey M, Martín-Vallejo FJ. Immediate effects of bilateral manipulation of talocrural joints on standing stability in healthy subjects. *Man Ther.* 2009 Feb;14(1):75-80. doi: 10.1016/j.math.2007.11.005.

ABSTRACT: The purpose of this study was to investigate the immediate effects of bilateral talocrural joint manipulation on standing stability in healthy subjects. Sixty-two healthy subjects, 16 males and 46 females, aged from 18 to 32 years old (mean: 21+/-3 years old) participated in the study. Subjects were randomly divided into two groups: an intervention group (n=32), who received manipulation of bilateral talocrural joints and a control group (n=30) which did not receive any intervention. Baropodometric and stabilometric evaluations were assessed pre- and 5 min post-intervention by an assessor blinded to the treatment allocation. Intra-group and inter-group comparisons were analysed using appropriate parametric tests. The results indicated that changes on the X coordinate range, length of motion, and mean speed approximated to statistical significance (P=0.06), and changes on the Y coordinate range reached statistical significance (P=0.02). Average X and Y motions, and anterior-posterior or lateral velocities did not show significant differences. Our results showed that bilateral thrust manipulation of the talocrural joint did not modify standing stability, that is, the behavioural pattern of the projection of the centre of pressure, in healthy subjects.

Beazell MR, Grindstaff TL, Sauer LD, Magrum EM, Ingersoll CD, Hertel J. Effects of a proximal or distal tibiofibular joint manipulation of ankle range of motion and functional outcomes in individuals with chronic ankle instability. *J Orthop Sports Phys Ther* 2012;42(2):125-134. doi:10.2519/jospt.2012.3729

STUDY DESIGN: Randomized clinical trial.

OBJECTIVES: To determine whether manipulation of the proximal or distal tibiofibular joint would change ankle dorsiflexion range of motion and functional outcomes over a 3-week period in individuals with chronic ankle instability.

BACKGROUND: Altered joint arthrokinematics may play a role in chronic ankle instability dysfunction. Joint mobilization or manipulation may offer the ability to restore normal joint arthrokinematics and improve function.

METHODS: Forty-three participants (mean \pm SD age, 25.6 \pm 7.6 years; height, 174.3 \pm 10.2 cm; mass, 74.6 \pm 16.7 kg) with chronic ankle instability were randomized to proximal tibiofibular joint manipulation, distal tibiofibular joint manipulation, or a control group. Outcome measures included ankle dorsiflexion range of motion, the single-limb stance on foam component of the Balance Error Scoring System, the step-down test, and the Foot and Ankle Ability Measure sports subscale. Measurements were obtained prior to the intervention (before day 1) and following the intervention (on days 1, 7, 14, and 21).

RESULTS: There was no significant change in dorsiflexion between groups across time. When groups were pooled, there was a significant increase ($P < .001$) in dorsiflexion at each postintervention time interval. No differences were found among the Balance Error Scoring System foam, step-down test, and Foot and Ankle Ability Measure sports subscale scores.

CONCLUSIONS: The use of a proximal or distal tibiofibular joint manipulation in isolation did not enhance outcome effects beyond those of the control group. Collectively, all groups demonstrated increases in ankle dorsiflexion range of motion over the 3-week intervention period. These increases might have been due to practice effects associated with repeated testing.

LEVEL OF EVIDENCE: Therapy, level 2b-.

Brandon K, Patla C. Differential diagnosis and treatment of iliotibial band pain secondary to a hypomobile cuboid in a 24-year-old female tri-athlete. *J Man Manip Ther.* 2013 Aug;21(3):142-7. doi: 10.1179/2042618613Y.0000000031.

ABSTRACT: The purpose of this case report is to relate an episode of movement impairment at the cuboid calcaneal articulation leading to symptoms of iliotibial band (ITB) syndrome. An explanation of the etiology and clinical diagnosis in relation to the differential diagnosis, treatment techniques, and patient outcomes are described. The 24-year-old female tri-athlete reported pain at Gerdy's tubercle and lateral femoral condyle areas occurring within 2 miles of a run. VAS score was 6/10 for the running activity and the lower extremity functional scale (LEFS) score was 93% (74/80). Over the previous 2 years, the ITB symptoms had failed to resolve with extensive conservative treatment at the knee. On weight bearing, the patient demonstrated pain free limitation of active midtarsal pronation more than supination, which correlated with a decrease in passive internal rotation of the cuboid. Symptoms resolved after one cuboid whip manipulation and the patient was able to run pain free. Post-manipulation treatment consisted of two more sessions, which included motor retraining for weight bearing active midtarsal pronation and supination. LEFS was 100% (80/80) and VAS 0/10 with running greater than 10 miles. While causality cannot be inferred

from a single case, this report may foster further investigation regarding the differential diagnosis and treatment of a hypomobile cuboid.

Brantingham JW, Cassa TK. Manipulative and multimodal therapies in the treatment of osteoarthritis of the great toe: a case series. *J Chiropr Med.* 2015 Dec; 14(4): 270-278. doi: [10.1016/j.jcm.2015.07.003](https://doi.org/10.1016/j.jcm.2015.07.003)

OBJECTIVE: The objective of this case series is to describe manual manipulative therapy with exercise for 3 patients with mild to moderate osteoarthritis of the great toe.

CLINICAL FEATURES: Three patients, a 32-year-old man, a 55-year-old woman, and a 49-year-old woman, had great toe pain of 8, 1, and 2 years, respectively. Each had a palpable exostosis, a benign outgrowth of bone projecting outward from the bone surface, and decreased dorsiflexion with a hard end-feel.

INTERVENTIONS AND OUTCOME: Manual manipulative therapy with exercise, the Brantingham protocol, was used with patients receiving 6, 9, and 12 treatments over 6 weeks. Specific outcome measures for hallux rigidus and the foot were chosen to document the effects of this intervention including digital inclinometry, the lower extremity functional scale, the foot functional index, overall therapy effectiveness and Visual Analogue Scale (VAS). Each patient had an increase in range of motion that surpassed the minimal clinically important change, an increase in the overall therapy effectiveness and a decrease in the foot functional index that surpassed the minimally clinically important difference. Most importantly for the patients, each reported a decrease in both usual and worst pain on the VAS that exceeded the minimally clinically important difference of 20 to 30 mm.

CONCLUSION: The 3 patients reported decreased pain measured by the VAS, increased range of motion and minimally clinically important difference in 3 other outcome measures.

Brantingham JW, Globe GA, Jensen ML, et al. A feasibility study comparing two chiropractic protocols in the treatment of patellofemoral pain syndrome. *J Manipulative Physiol Ther.* Sep 2009;32(7):536-548.

OBJECTIVE: The purpose of this pilot study was to determine the feasibility of (1) using the existing clinic, clinicians, interns, faculty, and staff from our college in conducting all components of a planned randomized controlled clinical trial; (2) successfully recruiting patients with patellofemoral pain syndrome (PFPS); and (3) consistently, effectively, and safely implementing the study protocols and therapy.

METHODS: Diagnostic, treatment, and blind assessment procedures were carried out while recruitment and administrative techniques for managing long-term storage of data and files were developed. Thirty-one patients were randomized into a local manipulative group (group A) or to a full kinetic chain manipulative therapy group (group B), each combined with exercise

and soft tissue treatment. The Anterior Knee Pain Scale, visual analog scale, and Patient Satisfaction Scale were used.

RESULTS: All phases of the feasibility study including use of the clinic, staff, recruitment techniques, treatment protocols, data collection, input, and analysis were effectively and safely carried out.

CONCLUSIONS: A feasibility study investigating the ability to conduct a randomized controlled trial of a manipulative therapy protocol for PFPS using available chiropractic college infrastructure was accomplished. A fully powered PFPS trial is feasible and merited.

Brantingham JW, Globe G, Pollard H, Hicks M, Korporaal C, Hoskins W.
Manipulative therapy for lower extremity conditions: expansion of literature review. *J Manipulative Physiol Ther.* 2009 Jan;32(1):53-71. doi:
<http://dx.doi.org/10.1016/j.jmpt.2008.09.013>

OBJECTIVE: The purpose of this study was to conduct a systematic review on manipulative therapy for lower extremity conditions and expand on a previously published literature review.

METHODS: The Scientific Commission of the Council on Chiropractic Guidelines and Practice Parameters (CCGPP) was charged with developing literature syntheses, organized by anatomical region, to evaluate and report on the evidence base for chiropractic care. This article is the outcome of this charge. As part of the CCGPP process, preliminary drafts of these articles were posted on the CCGPP Web site www.ccgpp.org (2006-8) to allow for an open process and the broadest possible mechanism for stakeholder input. The Cumulative Index to Nursing and Allied Health Literature; PubMed; Manual, Alternative, and Natural Therapy Index System; Science Direct; and Index to Chiropractic Literature were searched from December 2006 to February 2008. Search terms included *chiropractic, osteopathic, orthopedic, or physical therapy* and MeSH terms for each region. Inclusion criteria required a diagnosis and manipulative therapy (mobilization and manipulation grades I-V) with or without adjunctive care. Exclusion criteria were pain referred from spinal sites (without diagnosis), referral for surgery, and conditions contraindicated for manipulative therapy. Clinical trials were assessed using a modified Scottish Intercollegiate Guidelines Network ranking system.

RESULTS: Of the total 389 citations captured, 39 were determined to be relevant. There is a level of C or limited evidence for manipulative therapy combined with multimodal or exercise therapy for hip osteoarthritis. There is a level of B or fair evidence for manipulative therapy of the knee and/or full kinetic chain, and of the ankle and/or foot, combined with multimodal or exercise therapy for knee osteoarthritis, patellofemoral pain syndrome, and ankle inversion sprain. There is also a level of C or limited evidence for manipulative therapy of the ankle and/or foot combined with multimodal or exercise therapy for plantar fasciitis, metatarsalgia, and hallux limitus/rigidus. There is also a level of I or insufficient evidence for

manipulative therapy of the ankle and/or foot combined with multimodal or exercise therapy for hallux abducto valgus.

CONCLUSIONS: There are a growing number of peer-reviewed studies of manipulative therapy for lower extremity disorders.

Childs JD, Fritz JM, Flynn TW, et al. A clinical prediction rule to identify patients with low back pain most likely to benefit from spinal manipulation: a validation study. *Ann Intern Med.* Dec 21 2004;141(12):920-928.

BACKGROUND: Conflicting evidence exists about the effectiveness of spinal manipulation.

OBJECTIVE: To validate a manipulation clinical prediction rule.

DESIGN: Multicenter randomized, controlled trial.

SETTING: Physical therapy clinics.

PATIENTS: 131 consecutive patients with low back pain, 18 to 60 years of age, who were referred to physical therapy.

INTERVENTION: Patients were randomly assigned to receive manipulation plus exercise or exercise alone by a physical therapist for 4 weeks.

MEASUREMENTS: Patients were examined according to the clinical prediction rule criteria (symptom duration, symptom location, fear-avoidance beliefs, lumbar mobility, and hip rotation range of motion). Disability and pain at 1 and 4 weeks and 6 months were assessed.

RESULTS: Outcome from spinal manipulation depends on a patient's status on the prediction rule. Treatment effects are greatest for the subgroup of patients who were positive on the rule (at least 4 of 5 criteria met); health care utilization among this subgroup was decreased at 6 months. Compared with patients who were negative on the rule and received exercise, the odds of a successful outcome among patients who were positive on the rule and received manipulation were 60.8 (95% CI, 5.2 to 704.7). The odds were 2.4 (CI, 0.83 to 6.9) among patients who were negative on the rule and received manipulation and 1.0 (CI, 0.28 to 3.6) among patients who were positive on the rule and received exercise. A patient who was positive on the rule and received manipulation has a 92% chance of a successful outcome, with an associated number needed to treat for benefit at 4 weeks of 1.9 (CI, 1.4 to 3.5).

LIMITATIONS: The response rate for the 6-month follow-up resulted in inadequate power to detect statistically significant differences for some comparisons.

CONCLUSIONS: The spinal manipulation clinical prediction rule can be used to improve decision making for patients with low back pain.

Cleland JA, Fritz JM, Kulig K, Davenport TE, Eberhart S, Magel J, Childs JD. Comparison of the effectiveness of three manual physical therapy techniques in a subgroup of patients with low back pain who satisfy a clinical prediction rule: a randomized clinical trial. *Spine*. 2009;34(25): 2720-2729.

STUDY DESIGN: Randomized clinical trial.

OBJECTIVE: The purpose of this randomized clinical trial was to examine the generalizability of 3 different manual therapy techniques in a patient population with low back pain that satisfy a clinical prediction rule (CPR).

SUMMARY OF BACKGROUND DATA: Recently a CPR that identifies patients with LBP who are likely to respond rapidly and dramatically to thrust manipulation has been developed and validated. The generalizability of the CPR requires further investigation.

METHODS: A total of 112 patients were enrolled in the trial and provided demographic information and completed a number of self-report questionnaires including the Oswestry Disability Questionnaire (ODQ) and the Numerical Pain Rating Scale (NPRS) at baseline, 1-week, 4-weeks, and 6-months. Patients were randomly assigned to receive 1 of the 3 manual therapy techniques for 2 consecutive treatment sessions followed by exercise regimen for an additional 3 sessions. We examined the primary aim using a linear mixed model for repeated measures, using the ODQ and NPRS as dependent variables. The hypothesis of interest was the group by time interaction, which was further explored with pair-wise comparisons of the estimated marginal means.

RESULTS: There was a significant group x time interaction for the ODQ ($P < 0.001$) and NPRS scores ($P = 0.001$). Pair-wise comparisons revealed no differences between the supine thrust manipulation and side-lying thrust manipulation at any follow-up period. Significant differences in the ODQ and NPRS existed at each follow-up between the thrust manipulation and the nonthrust manipulation groups at 1-week and 4-weeks. There was also a significant difference in ODQ scores at 6-months in favor of the thrust groups.

CONCLUSION: The results of the study support the generalizability of the CPR to another thrust manipulation technique, but not to the nonthrust manipulation technique that was used in this study. In general, our results also provided support that the CPR can be generalized to different settings from which it was derived and validated. However, additional research is needed to examine this issue.

Crowell MS, Wofford NH. Lumbopelvic manipulation in patients with patellofemoral pain syndrome. *J Man Manip Ther*. 2012 Aut;20(3):113-120. doi: 10.1179/2042618612Y.0000000002.

OBJECTIVE: A recent clinical prediction rule (CPR) identified characteristics that may predict an immediate reduction in pain following lumbopelvic manipulation in patients with patellofemoral pain syndrome. The purpose of this single-arm cohort study was to replicate the proposed CPR in a different

population and investigate changes in self-reported pain, hip range of motion, strength, and function immediately following lumbopelvic manipulation.

METHODS: Forty-four subjects (63.6% female; mean age 27.4 years) met inclusion criteria. Hip internal rotation range of motion, lower extremity strength using a handheld dynamometer, and single/triple hop tests were assessed prior to and immediately following a spinal manipulation. A global rating of change questionnaire was administered after testing and telephonically at 1 week. Paired t-tests compared pre- and post-manipulation range of motion, strength, and hop test limb symmetry indices ($\alpha=0.05$).

RESULTS: Fifty-seven percent of subjects had a successful outcome measured by the numerical pain rating scale immediately following manipulation. Twenty-five of subjects experienced a successful outcome as measured by the global rating of change questionnaire at 1 week. No single individual or combination of predictor variables predicted a positive outcome immediately following the lumbopelvic manipulation (+likelihood ratio 0.7 with three of five predictor variables present). Statistically significant differences ($P<0.05$) were found in hip extension and abduction strength and hip internal rotation symmetry post-manipulation, but do not appear to be clinically meaningful.

DISCUSSION: The previously identified CPR was not able to be replicated and no clinically meaningful changes in range of motion, strength, or function were apparent. Future research should focus on a comprehensive impairment-based treatment approach in patients with patellofemoral pain syndrome.

Daniels CJ, Morrell AP. Chiropractic management of pediatric plantar fasciitis: a case report. *J Chiropr Med.* 2012 Mar;11(1):58-63. doi: 10.1016/j.jcm.2011.06.009

OBJECTIVE: The purpose of this report is to present the case of a 10-year-old football player with bilateral plantar fasciitis who improved with a multimodal conservative approach using chiropractic treatment.

CLINICAL FEATURES: The patient presented with bilateral plantar heel pain at the origin of the plantar fascia with a duration of 3 weeks.

INTERVENTION AND OUTCOME: Treatment was provided for 6 visits over a 6-week period. Chiropractic care consisted of manipulative therapy, soft tissue therapy, and home rehabilitation exercises. The soft tissue technique (Graston Technique) was performed to the origin of the plantar fascia and the triceps surae bilaterally. High-velocity, low-amplitude manipulation was applied to the restricted ankle mortise joint. After 6 treatments, the patient reported resolution of foot pain bilaterally and improvements in activities of daily livings. Three months later, the patient reported no further complications and the absence of pain.

CONCLUSION: This patient with bilateral plantar fasciitis improved after a course of a multimodal treatment approach using chiropractic manipulation and soft tissue therapy in addition to exercise and stretching therapies.

Durall CJ. Examination and treatment of cuboid syndrome: a literature review. *Sports Health*. 2011;3:514-519. doi: 0.1177/1941738111405965

CONTEXT: Cuboid syndrome is thought to be a common source of lateral midfoot pain in athletes.

EVIDENCE ACQUISITION: A Medline search was performed via PubMed (through June 2010) using the search terms *cuboid, syndrome, subluxed, locked, fault, dropped, peroneal, lateral, plantar*, and *neuritis* with the Boolean term AND in all possible combinations. Retrieved articles were hand searched for additional relevant references.

RESULTS: Cuboid syndrome is thought to arise from subtle disruption of the arthrokinematics or structural congruity of the calcaneocuboid joint, although the precise pathomechanic mechanism has not been elucidated. Fibroadipose synovial folds (or labra) within the calcaneocuboid joint may play a role in the cause of cuboid syndrome, but this is highly speculative. The symptoms of cuboid syndrome resemble those of a ligament sprain. Currently, there are no definitive diagnostic tests for this condition. Case reports suggest that cuboid syndrome often responds favorably to manipulation and/or external support.

CONCLUSIONS: Evidence-based guidelines regarding cuboid syndrome are lacking. Consequently, the diagnosis of cuboid syndrome is often based on a constellation of signs and symptoms and a high index of suspicion. Unless contraindicated, manipulation of the cuboid should be considered as an initial treatment.

Hoskins W, McHardy A, Pollard H, Windsham R, Onley R. Chiropractic treatment of lower extremity conditions: a literature review. *J Manipulative Physiol Ther*. 2006;29(8):658 – 671. doi: <http://dx.doi.org/10.1016/j.jmpt.2006.08.004>

OBJECTIVE: The purpose of this study was to document the quantity and type of research conducted on the chiropractic management of lower extremity conditions.

METHODS: A review of the literature was conducted using the CINAHL, MEDLINE, MANTIS, and Science Direct databases (each from inception to December 15, 2005). Search terms included *chiropractic, hip, knee, ankle, foot*, with Medical Subject Heading terms for each region. Inclusion criteria included studies with a lower extremity diagnosis, and the treatment was performed by doctors of chiropractic. Articles were excluded if pain was referred from spinal sites and if there was a duplicate publication; articles published in non-peer-reviewed literature and abstracts in conference proceedings were also excluded. Of the articles identified, an analysis was conducted assessing those including peripheral and/or spinal treatment. Clinical trials were assessed for quality using the Physiotherapy Evidence Database scale.

RESULTS: There was a total of 1652 citations. Of these, 76 were deemed relevant; 24 were related to the foot, 10 to the ankle, 25 to the knee, and 17 to the hip. Twenty-nine citations included spinal treatment, 47 solely peripheral, and 2 solely spinal. Ten citations were clinical trials and scored on the Physiotherapy Evidence Database scale.

CONCLUSIONS: Literature on the chiropractic management of lower extremity conditions has a large number of case studies (level 4 evidence) and a smaller number of higher-level publications (level 1-3 evidence). The management available in the peer-reviewed literature is predominantly multimodal and contains combined spinal and peripheral components. Future chiropractic research should use higher-level research designs, such as randomized controlled trials.

Jayaseelan DJ, Courtney CA, Kecman M, Alcorn D. Lumbar manipulation and exercise in the management of anterior knee pain and diminished quadriceps activation following ACL reconstruction: a case report. *Int J Sports Ther.* 2014;7(7):991-1003.

BACKGROUND AND PURPOSE: Quadriceps weakness is a common finding following knee injuries or surgery, and can be associated with significant functional limitations. This weakness or muscle inhibition may be due to central inhibitory mechanisms, rather than local peripheral dysfunction. Lumbopelvic manipulation has been shown to effect efferent muscle output by altering nociceptive processing. The purpose of this report is to describe the physical therapy management of anterior knee pain and chronic quadriceps weakness utilizing side-lying rotational lumbar thrust manipulation and therapeutic exercise for an individual eight months status-post ACL reconstruction

CASE DESCRIPTION: A 20 year-old male presented to physical therapy eight months following anterior cruciate ligament (ACL) reconstruction of the left knee with primary complaints of residual anterior knee pain and quadriceps weakness. The subject was treated with a multimodal approach using side-lying rotational lumbar thrust manipulation in addition to therapeutic exercise.

OUTCOMES: The subject was seen in physical therapy for eight sessions over eight weeks. Lower Extremity Functional Scale (LEFS) scores improved from 58/80 to 72/80, quadriceps force, measured by hand-held dynamometry (HHD), was improved from 70.6 lbs to 93.5 lbs and the subject was able to return to pain free participation in recreational sports.

DISCUSSION: Therapeutic exercises can facilitate improved quadriceps strength, however, in cases where quadriceps weakness persists and there is concurrent pain, other interventions should be considered. In this case, lower quarter stabilization exercise and lumbar thrust manipulation was associated with improved functional outcomes in a subject with anterior knee pain and quadriceps weakness. Side-lying rotational lumbar thrust

manipulation may be a beneficial adjunctive intervention to exercise in subjects with quadriceps weakness.

LEVEL OF EVIDENCE: 5, Single case report

Jennings J, Davies GJ. Treatment of cuboid syndrome secondary to lateral ankle sprains: a case series. *J Orthop Sports Phys Ther.* 2005 Jul;35(7):409-15.

STUDY DESIGN: Case series.

BACKGROUND: Plantar flexion/inversion ankle sprains are one of the most frequently occurring sports injuries. Cuboid syndrome, which is difficult to diagnose, may result from a plantar flexion/ inversion ankle injury and could become the source of lateral ankle/midfoot pain. The objective of this case series is to describe the examination, evaluation, and treatment of the cuboid syndrome following a lateral ankle sprain.

CASE DESCRIPTION: Seven patients were seen in our clinic 1 to 8 weeks following a lateral ankle sprain with a chief complaint of lateral ankle/midfoot pain. In these 7 patients, the presence of cuboid syndrome was identified independently by 2 examiners. Treatment consisted of a cuboid manipulation.

OUTCOMES: All 7 patients returned to sports activities following 1 to 2 treatments consisting of the "cuboid whip" manipulation. No recurrence of symptoms was reported upon immediate return to competition or during the remainder of the season (mean follow-up, 5.7 months; range, 2 to 8 months).

DISCUSSION: Based on those 7 patients, our results suggest that patients who are properly diagnosed with cuboid syndrome and receive the cuboid manipulation can return to competitive activity within 1 or 2 visits without injury recurrence.

Karason AB, Drysdale IP. Somatovisceral response following osteopathic HVLAT: a pilot study on the effect of unilateral lumbosacral high-velocity low-amplitude thrust technique on the cutaneous blood flow in the lower limb. *J Manipulative Physiol Ther.* 2003 May;26(4):220-5.

INTRODUCTION: Spinal manipulative treatment is widely used among manual therapists, although knowledge regarding the absolute physiological effects has not been clearly established. In this study, 20 healthy male subjects underwent a unilateral high-velocity low-amplitude thrust (HVLAT) to the lumbosacral junction, while the cutaneous blood flow in the corresponding dermatome of the lower limb was monitored.

METHODS: Subjects underwent a sham manipulation before the actual manipulation and acted as their own control. Laser Doppler flowmetry was used to measure relative changes in the cutaneous blood flow over the L5 dermatome for 5 minutes before the sham manipulation, for 5 minutes between the sham and the actual manipulation, and for 5 minutes after the

spinal adjustment. Analysis of variance (ANOVA) and Tukey post hoc analysis was used in the interpretation of the data.

RESULTS: Twelve nonsmoking subjects, who received a successful HVLAT manipulation, showed a significant increase ($P < .001$) in blood perfusion, both ipsilaterally and contralaterally. Six smokers responded with a significant decrease in blood flow ipsilaterally ($P < .01$) and contralaterally ($P < .001$) after HVLAT manipulation.

CONCLUSION: The results from this study support previous published hypotheses that spinal adjustments outside the region of the sympathetic outflow result in an increase in cutaneous blood flow. Further studies will be needed to confirm the outcome of this study, and more knowledge is needed regarding the specific neurophysiological effects of spinal manipulation.

López-Rodríguez S, Fernández de-Las-Peñas C, Albuquerque-Sendín F, Rodríguez-Blanco C, Palomeque-del-Cerro L. Immediate effects of manipulation of the talocrural joint on stabilometry and baropodometry in patients with ankle sprain. *J Manipulative Physiol Ther.* 2007 Mar-Apr;30(3):186-92.

OBJECTIVE: This study assessed the immediate effects of talocrural joint manipulation on stabilometric and baropodometric outcomes in patients with grade II ankle sprain.

METHODS: Fifty-two field hockey players (35 men and 17 women) between 18 and 40 years old (mean = 22.5 years, SD = 3.6 years) were included in this study. A simple blind, inpatient, placebo-controlled, and repeated-measures study was carried out. All the patients underwent a baropodometric study performed with a Foot Work force platform (4 times; pre-post placebo group and pre-post intervention group). The sample was subjected to two techniques of manipulative treatment: (a) talocrural joint manipulation and (b) posterior gliding manipulation over the talus. In a second instance, placebo manipulation was applied. Unilateral analysis of variance and multivariate analysis of variance were used for statistical analysis.

RESULTS: The results in the intervention group revealed significant differences in the percentage of posterior load on the foot ($P = .015$) and the percentage of bilateral anterior load ($P = .02$) before and after the manipulation. The placebo group did not show any change in any of the variables except for area ($P = .045$). Intergroup comparison revealed statistically significant differences in the increase in percentage of posterior load on the manipulated foot, percentage of bilateral posterior load, percentage of anterior load on the manipulated foot, and percentage of bilateral anterior load (with the exception of the total load on the foot).

CONCLUSIONS: The application of caudal talocrural joint manipulation, as compared with placebo manipulation, in athletic patients with grade II ankle sprain redistributed the load supports at the level of the foot.

Méndez-Sánchez R, González-Iglesias J, Sánchez-Sánchez JL, Puente-González AS. Immediate effects of bilateral sacroiliac joint manipulation on plantar pressure distribution in asymptomatic patients. *J Altern Complement Med.* 2014 Apr;20(4):251-7. doi: 10.1089/acm.2013.0192. Epub 2014 Feb 4.

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

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

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

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

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

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

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

Miller J, Westrick R, Diebal A, Marks C, Gerber JP. Immediate effects of lumbopelvic manipulation and lateral gluteal kinesiotaping on unilateral patellofemoral pain syndrome: a pilot study. *Sports Health.* 2013 May;5(3):214-9. doi: 10.1177/1941738112473561

OBJECTIVES: To determine the immediate effects of Kinesio taping directed to the hip and manipulation directed to the lumbopelvic region in individuals with unilateral patellofemoral pain syndrome (PFPS).

BACKGROUND: PFPS affects up to 25% of the general population. Despite the high prevalence, this condition is not clearly understood, as evidenced by the numerous proposed causes and recommended treatments. Notwithstanding, recent evidence suggests that treatments directed at the hip or spine may lead to beneficial results.

METHODS: A convenience sample of 18 participants (12 men and 6 women, 19.5 ± 1.15 years old) with unilateral PFPS was recruited. Participants were randomized by sex to 1 of 3 groups: Kinesio taping, manipulation, and control taping. The main outcome measures included the Y-balance test, squatting range of motion (ROM), and the Lower Extremity Functional Scale. **RESULTS:** Compared with the lumbopelvic manipulation and control groups, those in the Kinesio taping group performed significantly better on the Y-balance test ($F = 5.59, P = 0.02$) and with squatting ROM ($F = 3.93, P = 0.04$). The Kinesio taping and lumbopelvic groups were also significantly better than the control (sham) group with double-leg squatting ROM performance 3 days later.

CONCLUSION: Kinesio taping may facilitate gluteus medius activation and improve postural stability and a double-leg squat.

CLINICAL RELEVANCE: The improvement in affected limb reach and double-leg squatting ROM highlights the potential for Kinesio taping to improve gluteus medius activation. Lumbopelvic manipulation may also immediately improve rehabilitation programs for PFPS.

Motealleh A, Gheysari E, Shokri E, Sobhani S. The immediate effect of lumbopelvic manipulation of EMG of vasti and gluteus medius in athletes with patellofemoral pain syndrome: a randomized controlled trial. *Man Ther.* 2016 Apr;22:16-21. doi: 10.1016/j.math.2016.02.002.

OBJECTIVE: To evaluate the immediate effect of lumbopelvic manipulation on EMG activity of vastus medialis, vastus lateralis and gluteus medius as well as pain and functional performance of athletes with patellofemoral pain syndrome.

DESIGN: Randomized placebo-controlled trial.

METHODS: Twenty eight athletes with patellofemoral pain syndrome were randomly assigned to two groups. One group received a lumbopelvic manipulation at the side of the involved knee while the other group received a sham manipulation. EMG activity of the vasti and gluteus medius were recorded before and after manipulation while performing a rocking on heel task. The functional abilities were evaluated using two tests: step-down and single-leg hop. Additionally, the pain intensity during the functional tests was assessed using a visual analog scale.

RESULTS: The onset and amplitude of EMG activity from vastus medialis and gluteus medius were, respectively, earlier and higher in the manipulation group compared to the sham group. There were no significant differences, however, between two groups in EMG onset of vastus lateralis. While the scores of one-leg hop test were similar for both groups, significant

improvement was observed in step-down test and pain intensity in the manipulation group compared to the sham group.

CONCLUSIONS: Lubmopelvic manipulation might improve patellofemoral pain and functional level in athletes with patellofemoral pain syndrome. These effects could be due to the changes observed in EMG activity of gluteus medius and vasti muscles. Therefore, the lubmopelvic manipulation might be considered in the rehabilitation protocol of the athletes with patellofemoral pain syndrome.

Pellow JE, Brantingham JW. The efficacy of adjusting the ankle in the treatment of subacute and chronic grade I and grade II ankle inversion sprains. *J Manipulative Physiol Ther.* Jan 2001;24(1):17-24

OBJECTIVE: The purpose of this study was to determine the efficacy of adjusting the ankle in the treatment of subacute and chronic grade I and grade II ankle inversion sprains.

DESIGN: A single-blind, comparative, controlled pilot study.

SETTING: Technikon Natal Chiropractic Day Clinic.

PARTICIPANTS: Thirty patients with subacute and chronic grade I and grade II ankle inversion sprains. Patients were recruited from the public; they responded to advertisements placed in newspapers and on notice boards around the campus and local sports clubs.

INTERVENTION: Each of the 15 patients in the treatment group received the ankle mortise separation adjustment. Each of the 15 patients in the placebo group received 5 minutes of detuned ultrasound treatment. Each participant received a maximum of 8 treatment sessions spread over a period of 4 weeks.

MAIN OUTCOME MEASURE: Patients were evaluated at the first treatment, at the final treatment, and at a 1-month follow-up consultation. Subjective scores were obtained by means of the short-form McGill Pain Questionnaire and the Numerical Pain Rating Scale 101. Objective measurements were obtained from goniometer readings measuring ankle dorsiflexion range of motion and algometer readings measuring pain threshold over the ankle lateral ligaments. A functional evaluation of ankle function was also used.

RESULTS: Although both groups showed improvement, statistically significant differences in favor of the adjustment group were noted with respect to reduction in pain, increased ankle range of motion, and ankle function.

CONCLUSIONS: This study appears to indicate that the mortise separation adjustment may be superior to detuned ultrasound therapy in the management of subacute and chronic grade I and grade II inversion ankle sprains.

Sanders GD, Nitz AJ, Abel MG, Symons TB, Shapiro R, Black WS, Yates JW. Effects of lumbosacral manipulation on isokinetic strength of knee extensors and flexors in healthy subjects: a randomized, controlled, single-blind crossover trial. *J Chiropr Med.* 2015 Dec;14(4):240-8. doi: 10.1016/j.jcm.2015.08.002.

OBJECTIVE: The purpose of this study was to investigate the effect of manual manipulations targeting the lumbar spine and/or sacroiliac joint on concentric knee extension and flexion forces. Torque production was measured during isometric and isokinetic contractions.

METHODS: This was a randomized, controlled, single-blind crossover design with 21 asymptomatic, college-aged subjects who had never received spinal manipulation. During 2 separate sessions, subjects' peak torques were recorded while performing maximal voluntary contractions on an isokinetic dynamometer. Isometric knee extension and flexion were recorded at 60° of knee flexion, in addition to isokinetic measurements obtained at 60°/s and 180°/s. Baseline measurements were acquired before either treatment form of lumbosacral manipulation or sham manipulation, followed by identical peak torque measurements within 5 and 20 minutes posttreatment. Data were analyzed with a repeated measures analysis of variance.

RESULTS: A statistically significant difference did not occur between the effects of lumbosacral manipulation or the sham manipulation in the percentage changes of knee extension and flexion peak torques at 5 and 20 minutes posttreatment. Similar, nonsignificant results were observed in the overall percentage changes of isometric contractions (spinal manipulation 4.0 ± 9.5 vs sham 1.2 ± 6.3 , $P = .067$), isokinetic contractions at 60°/s (spinal manipulation - 4.0 ± 14.2 vs sham - 0.3 ± 8.2 , $P = .34$), and isokinetic contractions at 180°/s (spinal manipulation - 1.4 ± 13.9 vs sham - 5.5 ± 20.0 , $P = .18$).

CONCLUSION: The results of the current study suggest that spinal manipulation does not yield an immediate strength-enhancing effect about the knee in healthy, college-aged subjects when measured with isokinetic dynamometry.

Simpson BG, Simon CB. Lower extremity thrust and non-thrust joint mobilization for patellofemoral pain syndrome. *J Man Manip Ther.* 2014 May;22(2): 100-7. doi: 10.1179/2042618613Y.0000000042.

ABSTRACT: A 40-year old female presented to physical therapy with a one-year history of insidious right anteromedial and anterolateral knee pain. Additionally, the patient had a history of multiple lateral ankle sprains bilaterally, the last sprain occurring on the right ankle 1 year prior to the onset of knee pain. The patient was evaluated and given a physical therapy diagnosis of patellofemoral pain syndrome (PFPS), with associated talocrural and tibiofemoral joint hypomobility limiting ankle dorsiflexion and knee extension, respectively. Treatment included a high-velocity low amplitude

thrust manipulation to the talocrural joint, which helped restore normal ankle dorsiflexion range of motion. The patient also received tibiofemoral joint non-thrust manual therapy to regain normal knee extension mobility prior to implementing further functional progression exercises to her home program (HEP). This case report highlights the importance of a detailed evaluation of knee and ankle joint mobility in patients presenting with anterior knee pain. Further, manual physical therapy to the lower extremity was found to be successful in restoring normal movement patterns and pain-free function in a patient with chronic anterior knee pain.

Suter E, McMorland G, Herzog W, Bray R. Decrease in quadriceps inhibition after sacroiliac joint manipulation in patients with anterior knee pain. *J Manipulative Physiol Ther.* 1999 Mar-Apr; 22(3):149-153.

BACKGROUND: Evidence exists that conservative rehabilitation protocols fail to achieve full recovery of muscle strength and function after joint injuries. The lack of success has been attributed to the high amount of muscle inhibition found in patients with pathologic conditions of the knee joint. Clinical evaluation shows that anterior knee pain is typically associated with sacroiliac joint dysfunction, which may contribute to the muscle inhibition observed in this patient group.

OBJECTIVE: To assess whether sacroiliac joint manipulation alters muscle inhibition and strength of the knee extensor muscles in patients with anterior knee pain.

DESIGN AND SETTING: The effects of sacroiliac joint manipulation were evaluated in patients with anterior knee pain. The manipulation consisted of a high-velocity low-amplitude thrust in the side-lying position aimed at correcting sacroiliac joint dysfunction. Before and after the manipulation, torque, muscle inhibition, and muscle activation for the knee extensor muscles were measured during isometric contractions using a Cybex dynamometer, muscle stimulation, and electromyography, respectively.

PARTICIPANTS: Eighteen patients (mean age, 30.5 +/- 13.0 years) with either unilateral (n = 14) or bilateral (n = 4) anterior knee pain.

RESULTS: Patients showed substantial muscle inhibition in the involved and the contralateral legs as estimated by the interpolated twitch technique. After the manipulation, a decrease in muscle inhibition and increases in knee extensor torques and muscle activation were observed, particularly in the involved leg. In patients with bilateral anterior knee pain, muscle inhibition was decreased in both legs after sacroiliac joint adjustment.

CONCLUSIONS: Spinal manipulation might offer an interesting alternative treatment for patients with anterior knee pain and muscle inhibition. Because this clinical outcome study was of descriptive nature rather than a controlled design, biases might have occurred. Thus the results have to be verified in a randomized, controlled, double-blinded trial before firm conclusions can be drawn or recommendations can be made.

Whitman JM, Cleland JA, Mintken P, Keirns M, Bieniek ML, Albin SR, et al. Predicting short-term response to thrust and nonthrust manipulation and exercise in patients post inversion ankle sprain. *J Orthop Phys Ther* 2009;39(3):188-200. doi:10.2519/jospt.2009.2940

STUDY DESIGN: Prospective-cohort/predictive- validity study.

OBJECTIVES: To develop a clinical prediction rule (CPR) to identify patients who had sustained an inversion ankle sprain who would likely benefit from manual therapy and exercise.

BACKGROUND: No studies have investigated the predictive value of items from the clinical examination to identify patients with ankle sprains likely to benefit from manual therapy and general mobility exercises.

METHODS AND MEASURES: Consecutive patients with a status of post inversion ankle sprain underwent a standardized examination followed by manual therapy (both thrust and nonthrust manipulation) and general mobility exercises. Patients were classified as having experienced a successful outcome at the second and third sessions based on their perceived recovery. Potential predictor variables were entered into a stepwise logistic regression model to determine the most accurate set of variables for prediction of treatment success.

RESULTS: Eighty-five patients were included in the data analysis, of which 64 had a successful outcome (75%). A CPR with 4 variables was identified. If 3 of the 4 variables were present the accuracy of the rule was maximized (positive likelihood ratio, 5.9; 95% CI: 1.1, 41.6) and the posttest probability of success increased to 95%.

CONCLUSION: The CPR provides the ability to a priori identify patients with an inversion ankle sprain who are likely to exhibit rapid and dramatic short-term success with a treatment approach, including manual therapy and general mobility exercises.

LEVEL OF EVIDENCE: Prognosis, Level 2b.

