PERFORMING ARTS
SPECIAL INTEREST GROUP

ORTHOPAEDIC SECTION
AMERICAN PHYSICAL THERAPY ASSOCIATION

APTA
American Physical Therapy Association
The Science of Healing. The Art of Caring.

PASIG MONTHLY CITATION BLAST: No.69 **March 2012**

Dear Performing Arts Special Interest Group (PASIG) members and associates:

It was truly a pleasure meeting many of you at CSM 2012, and with a productive PASIG business meeting, we are on our way into this year with many great ideas from our members. Our PASIG Monthly Citation Blast is traditionally sent to **all Orthopaedic Section members** in March, following CSM. **If you join PASIG, which is *free* to all APTA Orthopaedic section members,** you will receive these informative compilations of current research on topics of interest in the rehabilitation and wellness care of performing artists.

The PASIG provides our members a Resource Page on our Orthopaedic Section website, with links to the following information:

- Archived monthly citation blasts
- Officer Listing
- Become a Member
- Member Directory
- PASIG Member Profile Update
- Clinical affiliations
- Education: Entry-level PT Programs With a Strong Performing Arts Curriculum
- Performing Arts Glossaries
- PASIG Student Scholarship information
- PASIG practice analysis technical report
- PASIG bulletin board
- PASIG resources
- APTA-CSM Orthopaedic Section PASIG annual meeting minutes

We would like to grow our networking sources for collaborative research and the development of new projects, for colleague contact and referral, and we welcome your thoughts and participation!

Please take the time to join PASIG by filling out the membership form:
https://www.orthopt.org/sig_pa_join.php

Additionally, we need you to update your profile:
https://www.orthopt.org/surveys/membership_directory.php

You can fill both short forms online once you've logged in as an Orthopaedic Section member.

Also, if you haven't already done so, please email me if you have a PA student clinical affiliation with the following information:

- Name of Practice
- Address
- Clinical coordinator
- Phone
- Fax
- E-mail
- % PA treated and type of artist
- Student requirement

Performing Arts Special Interest Group

Mission Statement:

The mission of the Performing Arts Special Interest Group (PASIG) is to be the leading resource for physical therapy as it relates to the performing arts. The special interest group serves its members and represents the interests of orthopaedic physical therapy by fostering high quality patient care and promoting professional growth through:

Advancement of education and clinical practice,
Facilitation of quality research,
Professional development of its members, and
Encouraging an interaction between the physical therapy and performing arts communities

Vision Statement:

The Performing Arts Special Interest Group (PASIG) is a leading authority in performing arts physical therapy. PASIG leads through professional development and dissemination of current information/trends, current practice, research initiatives and outreach programs with performing artists and performing arts groups.

PERFORMING ARTS CONTINUING EDUCATION AND CONFERENCES

****Performing Arts Independent Study Courses****

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 Independent Study Course. *Dance Medicine: Strategies for the Prevention and Care of Injuries to Dancers*.
This is a 6-monograph course and includes many PASIG members as authors.
- Epidemiology of Dance Injuries: Biopsychosocial Considerations in the Management of Dancer Health (MJ Liederbach),
- Nutrition, Hydration, Metabolism, and Thinness (B Glace),
- The Dancer's Hip: Anatomic, Biomechanical, and Rehabilitation Considerations (G. Grossman),
- Common Knee Injuries in Dance (MJ Liederbach),
- Foot and Ankle Injuries in the Dancer: Examination and Treatment Strategies (M. Molnar, R. Bernstein, M. Hartog, L. Henry, M. Rodriguez, J. Smith, A. Zujko),
- Developing Expert Physical Therapy Practice in Dance Medicine – (J. Gamboa, S. Bronner, TJ Manal).

Contact: Orthopaedic Section at: www.orthopt.org

Harkness Center for Dance Injuries, Hospital for Joint Diseases. Principles of Dance Medicine: Clinical management of the dancer patient. New York, NY, July 12 – 15, 2012. http://hjd.med.nyu.edu/harkness/education/healthcare-professionals/upcoming-educational-courses

Performing Arts Medical Association (PAMA). 30th Annual Symposium: Medical Problems of Performing Artists, Snowmass, CO, July 26 – 29, 2012. Contact: http://www.artsmed.org

International Association for Dance Medicine and Science: 22nd Annual Meeting, Singapore. October 25 – 28, 2012. Contact: http://www.iadms.org

A warm "Thank You" to our PASIG officers, past and present, especially outgoing research chair Shaw Bronner, PT, PhD, OCS, who will stay on committee to mentor me into this new office, and Kornelia Kulig, PT, PhD, FAPTA, who recently completed her work as APTA Orthopaedic Section liaison to the Performing Arts SIG.

For our March 2012 Citation BLAST, my intern, Shuree Gangloff, compiled abstracts on the topic, "The presence of femoral anterior glide medial rotation in dancers." The format is an annotated bibliography of articles generally from the last decade. The PASIG Research Committee initiated this monthly Citation BLAST on performing arts-related topics in June 2005 in the hopes of encouraging our members to stay current in the literature and, perhaps, consider conducting research themselves. Each month we send a new list of performing arts (PA) citations to members of the PASIG to further the pursuit of PA-related scholarship. (Information about EndNote referencing software can be found at http://www.endnote.com, including a 30-day free trial).

If after reading the summary and looking at the abstracts, you think, "There's much more to cover," or, "Someone should do a study on___," *fantastic!* Please join us and contact me about contributing to the citation blasts, providing mentorship to fellow members, contributing to our journal, giving a platform or poster presentation, helping out with PASIG work, or sharing new ideas. If you are looking for mentorship, or need help with your case reports, posters, or want to help with research, let us know. Wherever you are in the process, we would love to have you in our membership! I look forward to hearing from you!

Best Regards,
Annette

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PASIG Governing Board	Terms	
Julie O'Connell, President	2011-2014	
Kornelia Kulig, Board Liaison	2009-2012	*Thank you!*
Lisa Shoaf, Vice President/Ed Chair	2010-2013	

PASIG Committees		
Amy Humphrey, Student Scholarship	2008-2011	*Thank you!*
Laura Becica, Nominating Chair	2010-2013	
Amanda Blackmon, Nominating Committee	2011-2014	
Rosie Canizares, Nominating Committee	2012-2015	
Annette Karim, Research Chair	2012-2014	

The presence of femoral Anterior Glide Medial Rotation in dancers

Femoral Anterior Glide Medial Rotation (AGMR) is a problem commonly found in dancers with low back, hip and knee pain. AGMR is the result of dysfunctional spinning of the femoral head within the acetabulum. This can be the result of the joint malalignment, muscle or capsular tightness, or the result of muscle imbalances pulling unequally against the joint. A tight posterior capsule prepositions the femur anteriorly in the acetabulum, limiting the amount of posterior movement and promoting anterior translation of the femoral head. Muscle imbalances in the hip, especially gluteus medius and maximus weakness, along with tightness of the anterior musculature, such as the psoas, encourage anterior translation along with a medial rotation of the femur. In weight bearing, this condition can promote genu valgus and excessive midfoot pronation. Low back pain is also a problem associated with this movement dysfunction due to the attachment of the psoas to the spine, pulling the lumbar spine into excessive lordosis.

Treatment for this condition may address strengthening the posterior musculature, stretching shortened anterior muscles, and mobilizing the posterior capsule. Hip flexor retraining includes gluteus medius and deep external rotator activation prior to psoas, to balance the force couple acting on the hip. Preventing excessive psoas firing with hip flexion allows for the femoral head to rotate in place rather than translating anteriorly. Treating this movement dysfunction early can prevent more serious problems from arising, such as psoas tendonitis, femoral acetabular impingement, anterior labral tears, and early hip osteoarthritis from repetitive sheering forces at the hip.

Shuree Gangloff, SPT
Azusa Pacific University
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Austin, AB, Souza RB, et al. (2008). Identification of abnormal hip motion associated with acetabular labral pathology. J Orthop Sports Phys Ther **38**(9): 558-565.

STUDY DESIGN: Resident's case problem

BACKGROUND: Recent literature has suggested that acetabular labral pathology secondary to femoroacetabular impingement (FAI) may be a precursor to early-onset hip osteoarthritis. The purpose of this resident's case problem was to explore the extent to which abnormal movement at the hip is a possible contributor to acetabular labral pathology.

DIAGNOSIS: The patient was a 25-year-old female with a 4-year history of anterior-medial groin pain. Based on a combination of the clinical examination and magnetic resonance imaging findings, she was given a diagnosis of acetabular labral tear by her orthopaedic surgeon and referred to a physical therapist for assessment. Movement analysis during a single-leg step down, running, and a drop jump maneuver revealed excessive hip adduction and internal rotation on the involved side, which reproduced her symptoms. Application of a hip-strapping device resulted in decreased hip adduction and internal rotation, and an immediate decrease in symptoms.

DISCUSSION: The reduction in pain secondary to controlling hip motion suggests that excessive frontal and transverse plane hip motions may contribute to FAI.

Accordingly, physical therapy intervention aimed at controlling and reducing hip adduction and internal rotation during activities may be indicated in patients who present with this movement pattern associated with anterior hip/groin pain.

Lewis, CL, Sahrmann, SA, et al. (2007). Anterior Hip Joint force increases with hip extension, decreased gluteal force, or decreased Iliopsoas force. J Biomech **40**(16): 3725-3731.

Abnormal or excessive force on the anterior hip joint may cause anterior hip pain, subtle hip instability and a tear of the acetabular labrum. We propose that both the pattern of muscle force and hip joint position can affect the magnitude of anterior joint force and thus possibly lead to excessive force and injury. The purpose of this study was to determine the effect of hip joint position and of weakness of the gluteal and iliopsoas muscles on anterior hip joint force. We used a musculoskeletal model to estimate hip joint forces during simulated prone hip extension and supine hip flexion under 4 different muscle force conditions and across a range of hip extension and flexion positions. Weakness of specified muscles was simulated by decreasing the modeled maximum force value for the gluteal muscles during hip extension and the iliopsoas muscle during hip flexion. We found that decreased force contribution from the gluteal muscles during hip extension and the iliopsoas muscle during hip flexion resulted in an increase in the anterior hip joint force. The anterior hip joint force was greater when the hip was in extension than when the hip was in flexion. Further studies are warranted to determine if increased utilization of the gluteal muscles during hip extension and of the iliopsoas muscle during hip flexion, and avoidance of hip extension beyond neutral would be beneficial for people with anterior hip pain, subtle hip instability, or an anterior acetabular labral tear.

Lewis, CL, Sahrmann, SA, et al. (2009). Effect of position and alteration in synergist muscle force contribution on hip forces when performing hip strengthening exercises. Clin Biomech **24**(1): 35-42.

BACKGROUND: Understanding the magnitude and direction of joint forces generated by hip strengthening exercises is essential for appropriate prescription and modification of these exercises. The purpose of this study was to evaluate hip joint forces created across a range of hip flexion and extension angles during two hip strengthening exercises: prone hip extension and supine hip flexion.
METHODS: A musculoskeletal model was used to estimate hip joint forces during simulated prone hip extension and supine hip flexion under a control condition and two altered synergist muscle force conditions. Decreased strength or activation of specific muscle groups was simulated by decreasing the modeled maximum force values by 50%. For prone hip extension, the gluteal muscle strength was decreased in one condition and the hamstring muscle strength in the second condition. For supine hip flexion, the strength of the iliacus and psoas muscles was decreased in one condition, and the rectus femoris, tensor fascia lata, and sartorius muscles in the second condition.
FINDINGS: The hip joint forces were affected by hip joint position and partially by alterations in muscle force contribution. For prone hip extension, the highest net resultant force occurred with the hip in extension and the gluteal muscles weakened. For supine hip flexion, the highest resultant forces occurred with the hip in extension and the iliacus and psoas muscles weakened.

INTERPRETATION: Clinicians can use this information to select exercises to provide appropriate prescription and pathology-specific modification of exercise.

Little, TL, Mansoor, J. (2008). Low back pain associated with internal snapping hip syndrome in a competitive cyclist. Br J Sports Med **42**(4): 308-309.

Low back pain is a common complaint among cyclists. Here we present the case of a competitive master cyclist with low back pain and whose symptoms ultimately resolved when he was treated for internal snapping hip syndrome. Internal snapping hip syndrome is a painful lesion of the iliopsoas caused by snapping of the tendon over the iliopectineal eminence or anterior femoral head when the femur is extended from a flexed position. This is the first published report that we are aware of that describes this syndrome as a potential cause of low back pain in a competitive cyclist.

Neumann, DA (2010). Kinesiology of the hip: a focus on muscular actions. J Orthop Sports Phys Ther **40**(2): 82-94.

The 21 muscles that cross the hip provide both triplanar movement and stability between the femur and acetabulum. The primary intent of this clinical commentary is to review and discuss the current understanding of the specific actions of the hip muscles. Analysis of their actions is based primarily on the spatial orientation of the muscles relative to the axes of rotation at the hip. The discussion of muscle actions is organized according to the 3 cardinal planes of motion. Actions are considered from both femoral-on-pelvic and pelvic-on-femoral perspectives, with particular attention to the role of coactivation of trunk muscles. Additional attention is paid to the biomechanical variables that alter the effectiveness, force, and torque of a given muscle action. The role of certain muscles in generating compression force at the hip is also presented. Throughout the commentary, the kinesiology of the muscles of the hip are considered primarily from normal but also pathological perspectives, supplemented with several clinically relevant scenarios. This overview should serve as a foundation for understanding the assessment and treatment of musculoskeletal impairments that involve not only the hip, but also the adjacent low back and knee regions.

Patrek MF, Kernozek TW, et al. (2011). Hip abductor fatigue and single limb landing mechanics in women athletes. J Athl Train **46**(1): 31-42.

CONTEXT: Reduced hip-abductor strength and muscle activation may be associated with altered lower extremity mechanics, which are thought to increase the risk for anterior cruciate ligament injury. However, experimental evidence supporting this relationship is limited.

OBJECTIVE: To examine the changes in single-leg landing mechanics and gluteus medius recruitment that occur after a hip-abductor fatigue protocol.

DESIGN: Descriptive laboratory study.

PATIENTS OR OTHER PARTICIPANTS: Twenty physically active women (age = 21.0 ± 1.3 years).

INTERVENTION(S): Participants were tested before (prefatigue) and after (postfatigue) a hip-abductor fatigue protocol consisting of repetitive side-lying hip abduction.

MAIN OUTCOME MEASURE(S): Outcome measures included sagittal-plane and frontal-plane hip and knee kinematics at initial contact and at 60 milliseconds after initial contact during 5 single-leg landings from a height of 40 cm. Peak hip and knee

sagittal-plane and frontal-plane joint moments during this time interval were also analyzed. Measures of gluteus medius activation, including latency, peak amplitude, and integrated signal, were recorded.
RESULTS: A small (<1°) increase in hip-abduction angle at initial contact and a small (<1°) decrease in knee-abduction (valgus) angle at 60 milliseconds after contact were observed in the postfatigue landing condition. No other kinematic changes were noted for the knee or hip at initial contact or at 60 milliseconds after initial contact. Peak external knee adduction moment decreased 27% and peak hip adduction moment decreased 24% during the postfatigue landing condition. Gluteus medius activation was delayed after the protocol, but no difference in peak or integrated signal was seen during the landing trials.
CONCLUSIONS: Changes observed during single-leg landings after hip-abductor fatigue were not generally considered unfavorable to the integrity of the anterior cruciate ligament. Further work may be justified to study the role of hip-abductor activation in protecting the knee during landing.

Willy RW, Davis IS (2011). The effect of a hip strengthening program on mechanics during running and during a single-leg squat. J Orthop Sports Phys Ther **41**(9): 625-632.

STUDY DESIGN: Block randomized controlled trial.
OBJECTIVES: To investigate whether a strengthening and movement education program, targeting the hip abductors and hip external rotators, alters hip mechanics during running and during a single-leg squat.
BACKGROUND: Abnormal movement patterns during running and single-leg squatting have been associated with a number of running-related injuries in females. Therapeutic interventions for these aberrant movement patterns typically include hip strengthening. While these strengthening programs have been shown to improve symptoms, it is unknown if the underlying mechanics during functional movements is altered.
METHODS: Twenty healthy females with excessive hip adduction during running, as determined by instrumented gait analysis, were recruited. The runners were matched by age and running distance, and randomized to either a training group or a control group. The training group completed a hip strengthening and movement education program 3 times per week for 6 weeks in addition to single-leg squat training with neuromuscular reeducation consisting of mirror and verbal feedback on proper mechanics. The control group did not receive an intervention but maintained the current running distance. Using a handheld dynamometer and standard motion capture procedures, hip strength and running and single-leg squat mechanics were compared before and after the strengthening and movement education program.
RESULTS: While hip abductor and external rotation strength increased significantly (P<.005) in the training group, there were no significant changes in hip or knee mechanics during running. However, during the single-leg squat, hip adduction, hip internal rotation, and contralateral pelvic drop all decreased significantly (P = .006, P = .006, and P = .02, respectively). The control group exhibited no changes in hip strength, nor in the single-leg squat or running mechanics at the conclusion of the 6-week study.
CONCLUSION: A training program that included hip strengthening and movement training specific to single-leg squatting did not alter running mechanics but did improve single-leg squat mechanics. These results suggest that hip strengthening

and movement training, when not specific to running, do not alter abnormal running mechanics.

Winston P, Awan R, et al. (2007). Clinical examination and ultrasound of self-reported snapping hip syndrome in elite ballet dancers. Am J Sports Med **35**(1): 118-126.

BACKGROUND: Although snapping hip syndrome is commonly reported in ballet dancers, the prevalence, impact, and underlying mechanism of this condition have not been formally studied within a cohort of dancers.
PURPOSE: To determine the prevalence, associated factors, and mechanisms of snapping hip and to investigate self-reported snapping with physical and ultrasound examination.
STUDY DESIGN: Cross-sectional study; Level of evidence, 3.
METHODS: A snapping hip questionnaire was completed by 87 unselected elite ballet dancers at 2 institutions. Twenty-six of the dancers (50 hips) who were able to voluntarily snap their hips were selected from this group for further physical examination by 2 clinicians to determine whether there was a palpable snap, and each underwent an ultrasound examination of his or her hips.
RESULTS: Ninety-one percent of dancers reported snapping hip, of which most (80%) had bilateral symptoms. Fifty-eight percent had pain associated with the snap, and 7% had taken time off dance because of this condition. Sixty percent of the dancers could voluntarily snap their hip. One or more of 3 dance movements elicited the snapping in 81%. The clinicians could palpate 46 of the 50 self-reported snapping hips. Ultrasound showed a snapping iliopsoas tendon in 59% of the hips and the iliotibial band snapping in 4%. In one third of cases, ultrasound was not helpful in identifying the cause of the snapping.
CONCLUSION: Snapping hip is extremely common in ballet dancers. Some dancers have significant pain, yet many are asymptomatic. Self-reported snapping is likely to be palpable by the clinician. Iliotibial band snapping is evident by physical examination and ultrasound. Iliopsoas snapping was most common and required ultrasonic confirmation.

Hope you enjoyed this PASIG citation blast! To receive future PASIG monthly citation blasts, please take the time to join PASIG by filling out the membership form: https://www.orthopt.org/sig_pa_join.php