



PASIG **PERFORMING ARTS**
SPECIAL INTEREST GROUP



PASIG MONTHLY CITATION BLAST: No. 106

July 2015

Dear Performing Arts SIG members:

This month the PASIG leadership will conduct our annual conference call. The August citation blast will include all updates and new announcements for PASIG membership resulting from this meeting. I look forward to sharing with you!

A **PASIG student scholarship** is available for performing arts poster and platform presentations at CSM 2016! Once you are accepted to present at CSM 2016, contact Anna Saunders, PASIG student scholarship chair, with your abstract: annarosemary@gmail.com

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

Call for 2016 PASIG committee chairs! We will have several positions available. Please consider nominating yourself and a colleague. For more information, contact Liz Chesarek: echesarek@gmail.com

The **Performing Arts Fellowship Taskforce practice analysis survey** will be out soon, so keep an eye out for more information.

Tweet Tweet! We have a Twitter page!

<https://twitter.com/PT4Performers>

Post your articles and info on your site, let's get connected!

Facebook

Check out the Orthopaedic section Facebook page, where you can find and post PASIG info: <https://www.facebook.com/pages/APTA-Orthopaedic-Section/121020534595362>

Below is a list of the PASIG leadership. Please consult this list regarding contact info:

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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:

Stress fractures of the foot and ankle

Dry needling

Dynamic Warm Up and Stretching

Platelet Rich Plasma Injections

Back Pain in Dancers

Hallux Valgus in Dancers

Posterior ankle impingement

TMD in Musicians

Concussions

Bone Mineral Density in Dancers

Serratus Anterior Strengthening for Dancers

Focal Dystonia

I would like to thank Kelli Barton and Alyssa Hartley for contributing to this month's citation blast: *Stress Fractures of the Foot and Ankle*. We love having contributions from our members regarding topics of great interest. **If you are interested in contributing by writing a citation blast, contact me, Brooke Winder:**
BrookeRwinder@gmail.com

Best regards,

Brooke

Brooke Winder, PT, DPT, OCS

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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

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)

Stress Fractures of the Foot and Ankle

The PASIG Citation Blast in September 2014 provided a wealth of information regarding bone density issues in dancers related to nutritional deficits and training demands. For some dancers, these demands become too much for the bones of the lower extremity, particularly the foot and ankle, causing a stress fracture to form. Dancers in particular are at a higher risk for stress fractures at the base of the second metatarsal secondary to stress at the articulation with the cuneiform bones during weight bearing on a plantarflexed foot. Our job as performing arts physical therapists is to recognize the signs and symptoms of a stress fracture, facilitate a referral if necessary, encourage activity modification and rest, and provide appropriate physical therapy interventions for the dancer. This month's PASIG Citation Blast highlights research regarding the differential diagnosis, evaluation, medical treatment, and rehabilitation for stress fractures of the foot and ankle with a focus on the second metatarsal base.

*Alyssa Hartley, DPT and Kelli Barton, DPT
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Albisetti W, Perugia D, De Bartolomeo O, Tagliabue L, Camerucci E, Calori GM. Stress fractures of the base of the metatarsal bones in young trainee ballet dancers. *Int Orthop*. 2010;34(1):51-55.

Classical ballet is an art form requiring extraordinary physical activity, characterised by rigorous training. These can lead to many overuse injuries arising from repetitive minor trauma. The purpose of this paper is to report our experience

in the diagnosis and treatment of stress fractures at the base of the second and third metatarsal bones in young ballet dancers. We considered 150 trainee ballet dancers from the Ballet Schools of "Teatro Alla Scala" of Milan from 2005 to 2007. Nineteen of them presented with stress fractures of the base of the metatarsal bones. We treated 18 dancers with external shockwave therapy (ESWT) and one with pulsed electromagnetic fields (EMF) and low-intensity ultrasound (US); all patients were recommended rest. In all cases good results were obtained. The best approach to metatarsal stress fractures is to diagnose them early through clinical examination and then through X-ray and MRI. ESWT gave good results, with a relatively short time of rest from the patients' activities and a return to dancing without pain.

Davidson G, Pizzari T, Mayes S. The influence of second toe and metatarsal length on stress fractures at the base of the second metatarsal in classical dancers. *Foot Ankle Int.* 2007;28(10):1082-1086.

Stress fractures at the base of the second metatarsal frequently occur in female classical dancers. There is a strong belief that a foot shape in which the first metatarsal or toe is shorter than the second metatarsal or toe increases the risk of this injury in dancers. However, there is a lack of empirical evidence to support this theory. The objective of this study was to examine the influence of the relative length difference between the first and second metatarsals and first and second toes on the frequency of stress fractures at the base of the second metatarsal in elite, female classical dancers. Methods: Both feet of 50 elite female classical dancers were measured for length differences between the first and second toes and first and second metatarsals. Retrospective analysis of dancers' medical histories revealed 17 feet with stress injury and 83 without. The mean of the difference between the metatarsal and toe length for the stress-injury group was compared to that of the control group. Results: No difference between the groups was identified for first and second toe length difference ($p = 0.865$) and the relative difference between the ends of the first two metatarsals ($p = 0.815$). Conclusions: Dancers who had a stress injury at the base of the second metatarsal displayed similar variances in the two independent variables as dancers who had not had such an injury.

Elias I, Zoga AC, Raikin SM, et al. Bone stress injury of the ankle in professional ballet dancers seen on MRI. *BMC Musculoskelet Disord.* 2008;9:39.

BACKGROUND: Ballet dancers have been shown to have a relatively high incidence of stress fractures of the foot and ankle. It was our objective to examine MR imaging patterns of bone marrow edema (BME) in the ankles of high performance professional ballet dancers, to evaluate clinical relevance.

METHODS: MR Imaging was performed on 12 ankles of 11 active professional ballet dancers (6 female, 5 male; mean age 24 years, range 19 to 32). Individuals were imaged on a 0.2 T or 1.5 T MRI units. Images were evaluated by two musculoskeletal radiologists and one orthopaedic surgeon in consensus for location and pattern of bone marrow edema. In order to control for recognized sources of bone marrow edema, images were also reviewed for presence of osseous, ligamentous, tendinous and cartilage injuries. Statistical analysis was performed to assess the strength of the correlation between bone marrow edema and ankle pain.

RESULTS: Bone marrow edema was seen only in the talus, and was a common finding, observed in nine of the twelve ankles imaged (75%) and was associated with pain in all cases. On fluid-sensitive sequences, bone marrow edema was ill-defined and centered in the talar neck or body, although in three cases it extended to the talar dome. No apparent gender predilection was noted. No occult stress fracture could be diagnosed. A moderately strong correlation ($\phi = 0.77$, $p = 0.0054$) was found between edema and pain in the study population.

CONCLUSION: Bone marrow edema seems to be a specific MRI finding in the talus of professional ballet dancers, likely related to biomechanical stress reactions, due to their frequently performed unique maneuvers. Clinically, this condition may indicate a sign of a bone stress injury of the ankle.

Goulart M, O'malley MJ, Hodgkins CW, Charlton TP. Foot and ankle fractures in dancers. *Clin Sports Med.* 2008;27(2):295-304.

Fractures in the dance population are common. Radiography, CT, MRI, and bone scan should be used as necessary to arrive at the correct diagnosis after meticulous physical examination. Treatment should address the fracture itself and any surrounding problems such as nutritional/hormonal issues and training/performance techniques and regimens. Compliance issues in this population are a concern, so treatment strategies should be tailored accordingly. Stress fractures in particular can present difficulties to the treating physician and may require prolonged treatment periods. This article addresses stress fractures of the fibula, calcaneus, navicular, and second metatarsal; fractures of the fifth metatarsal, sesamoids, and phalanges; and dislocation of toes.

Harrington T, Crichton KJ, Anderson IF. Overuse ballet injury of the base of the second metatarsal. A diagnostic problem. *Am J Sports Med.* 1993;21(4):591-598.

Performing classical ballet may cause major stress to the feet of the dancer. A variety of foot injuries have been described, with one such injury being an overuse syndrome involving the base of the second metatarsal and adjacent Lisfranc's joint. The diagnosis for this syndrome usually requires differentiating synovitis of Lisfranc's joint from a stress reaction of the base of the second metatarsal. Prompt

diagnosis is important since the treatment for these two conditions differs significantly and, in the case of bone stress reaction, delay can cause progression of the lesion. We report good clinical results in a group of eight ballerinas for whom we obtained early diagnosis and treatment of their injuries. This is in contrast to poor results reported in the literature if the diagnosis and management of these types of injuries are delayed. We developed a simple diagnostic protocol to enable diagnosis at presentation. When a bone stress reaction had progressed to a fracture line, a characteristic appearance was found on magnetic resonance imaging, suggesting a specific mechanism of injury. A possible mechanism for this injury is discussed.

Kennedy J, Hodgkins C, Colombier J, Guyette S, Hamilton W. Foot and ankle injuries in dancers. *International Sportmed Journal*. 2007;8(3):141-165.

Ballet is an exquisitely sophisticated and elegant art form. However its seeming ease and gracefulness belie the underlying physical stress. Much of a dancer's ability is reliant on favourable anatomy, strength and flexibility. Their foot mechanics, training and performing techniques are unique and thus they present with particular injury patterns. The following paper aims to address these differences and provide an approach to assessing and treating foot and ankle injuries in the ballet dancer.

Kadel NJ, Teitz CC, Kronmal RA. Stress fractures in ballet dancers. *Am J Sports Med*. 1992;20(4):445-9.

We surveyed 54 female dancers in two professional ballet companies. A total of 27 fractures were reported in 17 dancers. Metatarsal fractures were the most common (63%), followed by fractures of the tibia (22%) and spine (7%). Dancers who danced greater than 5 hours per day were significantly more likely to have a stress fracture than those dancing less than 5 hours per day. Dancers in the stress fracture group also had a significantly longer duration of amenorrhea than those in the group with no stress fractures. No significant difference was found between the dancers who had stress fractures and those who did not with regard to any of the other variables examined. These data suggest that prolonged amenorrheic intervals and heavy training schedules may predispose ballet dancers to stress fractures. Of the 17 dancers with stress fractures, only 1 had neither of these risk factors.

Kriz P, Rafferty J, Evangelista P, Van Valkenburg S, DiGiovanni C. Stress fracture of the second metatarsal and sprain of Lisfranc joint in a pre-professional ballet dancer. *J Dance Med Sci*. 2015;19(2):80-85.

We present the case of a 14-year-old preprofessional ballerina that demonstrates common features of two conditions affecting the midfoot that are often missed or

subject to delay in diagnosis in such young athletes: 1. stress fractures at the base of the second metatarsal, and 2. sprain of the Lisfranc joint complex. While these represent potentially career-altering injuries in the professional dancer, this case demonstrates that a high index of clinical suspicion, careful physical exam, appropriate radiographic assessment, and prompt treatment are essential to achieving the best possible outcome.

Murgia C. Overuse, tissue fatigue, and injuries. *J Dance Med Sci.* 2013;17(3):92-100.

Research has provided abundant evidence that overtraining is associated with fatigue and subsequent injury. For many years, it has been axiomatic that the vast majority of dance injuries are the result of overuse, and that dancers frequently persist in movement activities in the presence of microscopic injury--i.e., "dance through" injuries. While it is well-established fact that rest and adequate nutrition are vital components of training and conditioning, for various reasons it remains problematic for dancers to assimilate these requirements into their daily regimen. This review article provides some physiologically and biomechanically based information about the causes, inter-relationships, and consequences of these fundamental premises in dance science.

Muscolo L, Miguez A, Slullitel G, Costa-Paz M. Stress fracture nonunion at the base of the second metatarsal in a ballet dancer: a case report. *Am J Sports Med.* 2004;32(6):1535-1537.

Stress fractures are defined as spontaneous fractures of normal bone that are the result of repetitive stresses that are themselves harmless.¹ Although the metatarsal shaft is the most common location of a stress fracture in the general population, the base of the second metatarsal is by far the most common site in ballet dancers. Few series published in the orthopaedic literature report a quick recovery of this fracture after conservative treatment, and cases of nonunion have not been previously reported.^{2,3,5} We report a nonunion at the base of the second metatarsal, secondary to a stress fracture, in a 24-year-old professional ballet dancer with successful outcome after surgical repair.



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