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## Foot & Ankle SIG News & Updates

It was great seeing some of you at the FASIG Social and the foot and ankle programming sessions at CSM in Houston. Two notable updates since then:

- 1) Congratulations to Jeff Houck PT, PhD! Jeff received a well-deserved FA SIG Excellence in Service Award at CSM for his outstanding amount and quality of service provided to FA SIG initiatives.
- 2) Thank you and welcome to Stacey Meardon PT, PhD! Stacey has agreed to serve as our next FA SIG Research Chair. We will keep you up to date as we refine our research promotion activities.



**Andrew Arnosty, SPT:** Andrew is a DPT student at Duke University and is interested in promoting the best available evidence to treat and prevent chronic pain conditions in a physical therapy context. He has a background in behavioral therapy (Applied Behavioral Analysis) and is a Certified Strength and Conditioning Specialist (CSCS).

Congratulations to FASIG Student Team Members Andrea Rose and Adwaita Bhagwat on recently graduating from the University of Delaware. Please welcome our newest Team Members: Andrew Arnosty and Dylan LeClair!



**Dylan Leclair, SPT:** Dylan is a DPT student at the Mayo Clinic with a background in nutrition, exercise, and health science. As a former collegiate student-athlete and part-time coach, he has developed a passion for working with youth athletes, older adults, and individuals recovering from orthopedic conditions. Fun fact: "I love blending my interests in performance, rehab, and education to make an impact in every stage of life!"

The **FASIG Student Team** is looking for students to **join our team!** If interested, please contact Hayley Smitheman at [hayley.smitheman@unc.edu](mailto:hayley.smitheman@unc.edu)

## Member Spotlight

### Featuring Dr. Jennifer Zellers, DPT, PhD



#### Where are you originally from?

New Jersey – outside of Philadelphia

#### Where do you currently work?

Washington University School of Medicine in St. Louis

#### What type of setting do you work in?

Orthopaedics-based academic research

#### How did you become involved in research/academics?

I first became involved in research as an undergraduate research technician in a research lab developing preclinical models of ovarian cancer. Since that time, I've sought out opportunities to stay involved in research at every career phase, which ultimately led me to doing my PhD and building my own research group!

#### What sparked your interest in the foot and ankle?

I'm a former ballet dancer, so the foot and ankle have always been close to my heart. I was also very lucky to work with great mentors during my PhD and postdoctoral training who share my enthusiasm for the foot and ankle.

#### What is your current research interest?

My lab is interested in promoting precision rehabilitation for people with tendon injury. Our current work investigates the intersection of tendon healing and systemic disease, specifically the effect of type 2 diabetes/metabolic syndrome on Achilles tendon homeostasis and healing.

#### What are some key findings in your research thus far?

There is a strong prevailing framework that glycation (a binding together of the collagen components) of tendon tissue contributes to the increased risk of injury and impaired healing response in individuals with diabetes. Findings from our research suggest that loss of collagen organization – more so than glycation, alone – impairs tendon mechanical behavior in people with diabetes.

#### What would be good for physical therapists to know about tendon rehab?

Tendon is a mechanosensitive tissue, which makes our role of guiding progressive tendon loading incredibly important!

#### What are you most excited about for the future of foot and ankle research?

I think there is so much room for us to improve foot and ankle care. I'm excited for a future full of discovery.

- Andrew Arnosty, SPT, Duke University

FA SIG Updates

Member Spotlight –  
Dr. Jennifer Zellers, DPT,  
PhD

Feature – Posterior  
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Syndrome

Citation Blast – Posterior  
Ankle Impingement

# Posterior Ankle Impingement Syndrome

Posterior ankle impingement syndrome (PAIS) is frequently encountered by orthopedic physical therapists, especially in athletes who participate in activities requiring repetitive plantarflexion, such as ballet and soccer.<sup>1</sup> PAIS occurs when structures at the back of the ankle are compressed during plantarflexion, leading to pain, inflammation in acute cases, and restricted range of motion.<sup>1</sup> Causes include osseous (bony) and soft-tissue impingement, with repetitive stress primarily contributing to its development.<sup>1,2</sup>

PAIS can result from either an acute injury or chronic overuse.<sup>1</sup> The os trigonum, an accessory bone found in 7-49% of the population, is a frequent culprit in bony PAIS.<sup>1,2</sup> The Stieda process, an anatomical variant of the foot where the lateral tubercle of the talus is elongated, can also be involved in pathology ranging from fracture to PAIS.<sup>3</sup> Soft tissue structures such as the posterior talofibular ligament, flexor hallucis longus (FHL) tendon, or other posterior structures can become inflamed and contribute to soft tissue impingement.<sup>2</sup> During plantarflexion, the bony or soft tissues can become pinched between the tibia and calcaneus, causing irritation and pain.

PAIS is more common in athletes who engage in sports that require repetitive plantarflexion. Dancers, particularly ballet, are frequently affected due to the en pointe position where the ankle is maximally plantarflexed.<sup>1</sup> Gymnasts, soccer, and football players are also at increased risk due to repetitive push-off and forceful plantarflexion.<sup>1,4</sup> Risk factors for developing PAIS include a history of ankle sprains, structural abnormalities like the os trigonum, and poor ankle biomechanics, such as excessive pronation or a stiff ankle joint.<sup>4</sup>

Patients with PAIS typically present with deep pain at the back of the ankle, aggravated by activities involving plantarflexion.<sup>1,5</sup> Tenderness over the posterior joint line and limited range of motion are common clinical findings.<sup>5</sup> Clinical tests, such as the posterior ankle impingement test, are useful in reproducing symptoms.<sup>3</sup> Imaging studies, including X-rays, MRI, or ultrasound, are often employed to confirm the diagnosis, with X-rays revealing the presence of an os trigonum or other bony abnormalities and MRI detecting soft tissue impingement or tendon involvement.<sup>4</sup> However, X-rays have been reported to be normal in 71% of patients with PAIS as well as MRIs in 49% of pediatric patients that had PAIS.<sup>5</sup>

Management of PAIS typically starts with conservative treatments to reduce inflammation and pain.<sup>1</sup> Physical therapists guide activity modifications to prevent further irritation. Non-steroidal anti-inflammatory drugs (NSAIDs) may be prescribed, and injections can be considered for severe cases.<sup>1,2</sup> Treatment focuses on correcting biomechanical issues and restoring function, including strengthening calf and intrinsic foot muscles and using taping or orthotics for foot alignment.<sup>7,8</sup> As athletes progress, sport-specific rehabilitation is vital for a successful return, ensuring proper ankle mechanics during plantarflexion.<sup>8</sup> In chronic cases, surgery may be necessary to remove the os trigonum or debride soft tissue.<sup>6</sup> Prevention includes strengthening exercises, improving proprioception, and educating on proper biomechanics to avoid excessive plantarflexion.<sup>7</sup> Long-term management balances rest and structured loading to prevent recurrence while maintaining ankle joint integrity.<sup>8</sup>

In conclusion, PAIS is a common overuse injury in sports and activities involving repetitive plantarflexion. Early recognition and appropriate management are essential to prevent chronic symptoms and avoid surgical intervention. Physical therapists play a key role in both the prevention and rehabilitation of PAIS by addressing biomechanical deficiencies, promoting optimal loading, and ensuring a safe return to activity.

- Dylan LeClair, SPT, Mayo Clinic

## References

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8. Senécal I, Richer N. Conservative management of posterior ankle impingement: a case report. *J Can Chiropr Assoc.* 2016 Jun;60(2):164-74. PMID: 27385836; PMCID: PMC4915470.

## Citation Blast – Posterior Ankle Impingement

**Ráfare AL, Rodriguez BC, de Souza Ribeiro BF, Fernandes RMP, Babinski MA, Pires LAS. Os trigonum: a discussion of its role in posterior ankle impingement syndrome and a meta-analysis of its prevalence. *Surg Radiol Anat.* 2024;46(7):1137-1143. doi:10.1007/s00276-024-03389-8**

There are several causes for posterior ankle impingement syndrome (PAIS), including Os Trigonum, large posterior talus process, Stieda process, and soft tissue impingement. In this review, the authors assessed the prevalence of Os Trigonum, a supernumerary bone that develops in the back of the ankle. The authors included 18 articles in their meta-analysis, assessing 17,626 ankles, and found the prevalence of Os Trigonum to be 10.3%, with no significant differences regarding sex or side.

**Mansur NSB, Femino JE, Chinnakkannu K, et al. Posterior Ankle Impingement: It's Not Only About the Os Trigonum. *Foot Ankle Orthop.* 2024;9(1):24730114241241326. doi:10.1177/24730114241241326**

This study examined the prevalence of various conditions associated with trigonal impingement in PAIS. 111 ankles were assessed via posterior ankle and hindfoot arthroscopy: 74 with os trigonum and 37 with Stieda process impingement. Isolated trigonal bone impingement occurred in just 15.3% of total PAIS occurrences. The most common additional pathologies were FHL disorders (69.4%), followed by subtalar impingement (32.4%), posteromedial and lateral ankle synovitis (25.2% and 22.5% respectively), and posterior inferior tibiofibular ligament impingement (19.8%). Despite Os Trigonum being a primary cause of PAIS, there may be other concomitant conditions that should be considered prior to surgical management.

**Baillie P, Cook J, Ferrar K, Mayes S. Single-Leg Heel Raise Capacity is Lower, and Perceived Ankle Instability is Greater, in Dancers and Athletes With Posterior Ankle Impingement Syndrome. *Clin J Sport Med.* 2024;34(4):376-380. doi:10.1097/JSM.0000000000001217**

This study compared male and female professional dancers and athletes with and without PAIS to determine differences in clinical presentations. Participants with PAIS had significantly lower repetitions on the single-leg heel raise endurance test and higher perceived ankle stability per the Cumberland Ankle Instability Tool questionnaire. This suggests plantarflexor endurance and ankle instability may be beneficial to include in a thorough assessment of individuals with PAIS.

**Kushare I, Ditzler M, Gomez J, Jadhav S. Causes of delayed diagnosis of posterior ankle impingement in the pediatric and adolescent population. *Foot (Edinb).* 2021;47:101799. doi:10.1016/j.foot.2021.101799**

This prospective study aimed to identify potential causes for delayed diagnosis of PAIS in pediatric patients. It found that out of 47 patients under the age of 18, there was an average 14-month delay in diagnosis of PAIS. 70% of patients had seen multiple medical providers and were given other diagnoses. Radiographs were reported to be normal in 71% of ankles and PAIS was not identified in 49% of MRI reports. While pain with forced plantarflexion is a common sign of PAIS, it was only found in 41% of ankles in this study. However, posterior joint line tenderness was found in all ankles. Patients who underwent arthroscopic surgery had significant improvements in pain at 15-month follow-up. Visual Analog Scale pain improved from 6.9 to 0.9, and AOFAS ankle-hindfoot scores improved from 65 to 94. Several factors may lead to delayed diagnosis, and increased awareness about the features of PAIS, particularly posterior joint line tenderness, is needed among healthcare providers when treating young patients.

**Sugimoto K, Isomoto S, Samoto N, Matsui T, Tanaka Y. Arthroscopic Treatment of Posterior Ankle Impingement Syndrome: Mid-Term Clinical Results and a Learning Curve. *Arthrosc Sports Med Rehabil.* 2021;3(4):e1077-e1086. doi:10.1016/j.asmr.2021.03.013**

Arthroscopy allows for detailed examination of the ankle joint, decompression of soft tissue impingement (e.g. FHL tendinitis/tenosynovitis), and restoration of joint function. This study compared pre-operative and post-operative function in 59 sports-related patients (average age of 21.8 years) who underwent posterior ankle arthroscopy for PAIS. AOFAS ankle/hindfoot scores improved significantly from 79.6 to 97.6. The average time to resume training was 5.3 weeks and the time to return to competitive condition was 13.4 weeks, with all patients returning to sports/recreational activities. There were no significant differences in recovery time or clinical outcomes based on anatomical causes of PAIS.

- Andrea Rose, SPT, University of Delaware