The Peacock Press Test

The author presents
a new way of evaluating metatarsalgia.

BY DONALD PEACOCK, DPM, MS

Introduction

Mechanical metatarsalgia has numerous origins and the term itself is vague. It is the most common type of foot pain and disturbs a hefty portion of our patients. Metatarsalgia can be characterized as pain in the plantar forefoot associated with increased or abnormal pressure loading in the metatarsal heads.[1] This article is not intended to address how to treat metatarsalgia; the author's sole purpose is to describe a simple test to help evaluate metatarsalgia both pre-operatively and intra-operatively in order to select and perform the appropriate procedures as well as to monitor the results.

When it comes to metatarsal osteotomies, one of the questions faced is which metatarsals need addressing to achieve diminished forefoot pain.[2] To reasonably answer this issue is the crux of this paper. The test described here can be useful even if you never perform metatarsal osteotomies, so read on. While the author is unapologetically pro-minimally invasive surgery, this test can be utilized in MIS, traditional, and conservative circles with equal tenacity.

Studies to Evaluate Metatarsalgia

The standard studies for evaluating metatarsalgia involve radiographs. This is known to the reader and the common radiographic views, along with axial sesamoid views, bestow a wealth of information pre-operatively.[3] These well-documented and reproducible radiographs are hard to replicate intra-operatively, posing a dilemma for surgeons. The more elite plantar pressure testing systems are amazing.[4] Unfortunately, their intra-operative capabilities are currently improbable.

The author presents a test called the Peacock press test that can be performed pre-operatively and intra-operatively, utilizing a simple exam that takes into account foot type and utilizing the subjective position of the foot at toe-off, along with ultrasound quantification. The test is both subjective and objective. This makes the test very powerful. It satisfies our nature to make assessments objective by using ultrasound. The technique can be applied to those patients being biomechanically treated by allowing a better indication of the metatarsal positions during closed chain function. The information obtained from the test allows the practitioner to fabricate a more suitable orthotic and rehab plan to provide greater symptomatic relief of mechanical metatarsalgia.

Purposefully, this technique allows practitioners to treat metatarsalgia in their own unique way. For example, if you're in the camp that is wary of metatarsal osteotomies and prefer to treat metatarsalgia with such techniques as first ray stabilization combined with gastrocnemius

Continued on page 138

The standard studies for evaluating metatarsalgia involve radiographs.

New Concepts and Studies

"New Concepts" is a forum for the presentation of (1) new technologies and products which have been the subject of clinical study, and (2) new studies involving existing products. Readers should be aware that Podiatry Management does not specifically endorse any of the technologies, concepts, or products being discussed.

Peacock Press Test *(from page 137)*

recession and/or with digital tendon transfers, the effect of your efforts on the metatarsal position can be evaluated with the Peacock press test. Pick your weapon. It doesn't matter.

Think about it, do you really know how much first ray plantarflexion you've pulled off and its effect on metatarsal positioning at toe-off when the patient is on the operative table? Are you looking to reduce transfer lesions in practice? Place the patient in the Peacock press position, grab an ultrasound, and you will have an objective finding that will improve your outcomes.

The Peacock Press: Foot Typing

Prior to performing the Peacock press, it is essential to obtain a foot type. The test is dependent on the functional foot typing system which provides a way to look at the rearfoot and forefoot as they relate to the entire three-dimensional unit.[5]

Figure 1: Root neutral position with the forefoot loaded.

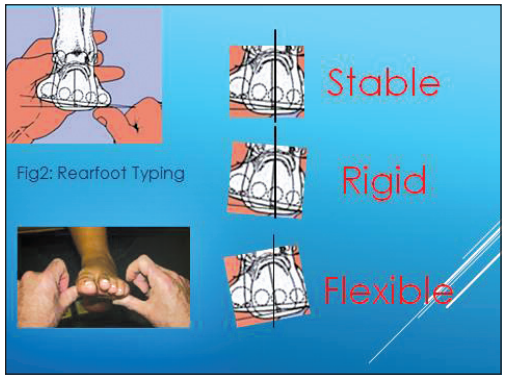

Figure 2: In a stable rearfoot, the calcaneous will move to a vertical position. In a rigid rearfoot, the calcaneous will fall short of vertical position. A flexible rearfoot will move past vertical position.

Foot Typing System

Basically, there are five different foot types.[5] These include:

1) rigid rearfoot/flexible forefoot
2) flexible rearfoot/flexible forefoot
3) stable rear foot/stable forefoot
4) flat rearfoot/flat forefoot
5) rigid rearfoot/rigid forefoot

Establish the foot type. The first step is to examine the patient supine and obtain Root neutral casting position (Figure 1).[5,6] The rearfoot range of motion is examined on the frontal plane first. With the forefoot loaded and in Root neutral position, the calcaneus is moved from medial to lateral to examine the rear foot position of the subtalar joint at supinatory and pronatory end ranges of motion (SERM and PERM). The rearfoot is classified as stable, rigid, or flexible and is based on the calcaneal movement relative to vertical axis (Figure 2).

Establish the forefoot classification. The foot is placed in Root neutral position with the forefoot loaded once again. The forefoot position of the first metatarsal is evaluated by a horizontal bisection of the fifth metatarsal head as to its pronatory and supinatory end ranges of motion (PERM and SERM). The forefoot is also classified as rigid, stable, or flexible (Figure 3).

Obtain the functional foot type classification. You simply classify the rearfoot along with the forefoot. For example, if the patient was examined and the rearfoot was found to be rigid and the forefoot was found to be flexible, the patient would have a rigid/flexible foot type, and this foot type is the most common type seen in mechanical metatarsalgia.[5]

Prior to performing the Peacock press, it is essential to obtain a foot type.

Fortunately, for our discussion, we can eliminate three of the five categories above. Patients with a stable/stable foot are seldom seen in our offices. These patients essentially have the most ideal foot type and most of their biomechanical symptoms will come from overuse or excess weight.

The flat rearfoot /flat forefoot patients inherit the flexible/flexible foot type that possesses high RF and FF total ranges of motion that over time collapse and stiffen to become flat feet with very low total ranges of motion. These patients obviously have a multitude of symptoms, and attending to these patients surgically often requires extensive reconstruction before addressing metatarsalgia.

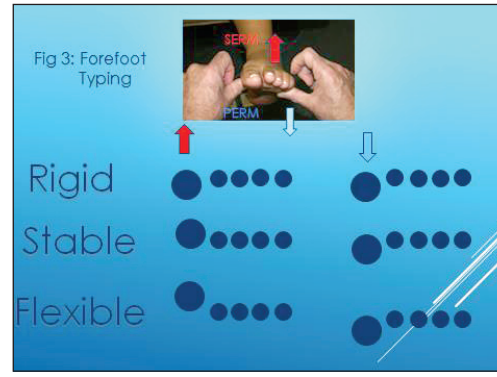

Figure: 3: A rigid forefoot will have a supinatory end range motion (SERM) below the 5th metatarsal and a pronatory end range motion (PERM) below the 5th metatarsal. A stable forefoot will have a SERM that is level with the 5th metatarsal and a PERM below the 5th metatarsal. A flexible forefoot will have a SERM above the 5th metatarsal level and a PERM that is below the 5th metatarsal level.

The rigid rearfoot/rigid forefoot types are our cavus patients. These patients are also treated as a separate entity from our discussion of mechanical metatarsalgia because they have a low FF PERM-SERM interval and, therefore, they are excluded.

Continued on page 140

Peacock Press Test *(from page 138)*

This leaves us with rigid/flexible and flexible/flexible foot types to contend with in our dialog. It should be noted that the functional foot typing system is more sophisticated than presented here. Knowledge of the five basic foot types will serve as a good foundation for initial clinical assessments. For more information on functional foot typing, the author suggests reading biomechanical topics by Dennis Shavelson, DPM.[5]

Figure 4: Peacock press displays 2nd and 3rd metatarsal blanching and feathering out.

Figure 5: Peacock Press intra-operatively following osteotomies of 2nd and 3rd

The Peacock press is applicable to the rigid rearfoot/flexible forefoot foot type that, as stated, is the most common foot type seen in mechanical metatarsalgia. It's also an effective test with flexible/flexible types status post-surgical stabilization of the rearfoot (i.e., Hyprocure, etc.). Suffice it to say that you need to transform a flexible/flexible foot to a rigid/flexible foot or forefoot care alone will fall short.

The Peacock Press: The Technique

The test is easy to perform. The first step is to place the foot in STJ neutral foot casting position.[6] With the patient in this well-known position, dorsiflexion is applied to the lesser digits and hallux. This will reveal or expose blanching in the forefoot. The locations that blanch the quickest and most completely need to be addressed.(Figure 4).

Case Study 1: 50-year-old male with chronic 2nd MPJ pain

This patient presented with chronic pain under the second metatarsal phalangeal joint. He had been treated with anti-inflammatories and periods of rest from work. On clinical exam, most of his pain was under the second metatarsal phalangeal joint area. He displayed symptoms of pre-dislocation of the second metatarsal phalangeal joint. The plantar plate was intact, as viewed under ultrasound exam. This case highlights the importance of the Peacock press test.

He would have developed a transfer pain under the third metatarsal if only the second metatarsal were addressed surgically. The photograph of the Peacock Press clearly demonstrates that this patient had increased pressure under the 2nd and 3rd metatarsals at toe off pre-operatively (Figure 4).

This result indicates abnormal pressure under the second and third metatarsals via blanching. Based on this exam, the patient underwent lesser metatarsal osteotomies of the 2nd and 3rd metatarsals, with complete resolve in pain. Figure 5 demonstrates the use of the Peacock Press intra-operatively in this patient. Note the diminishment of blanching under the second and third metatarsals immediately seen after the metatarsal osteotomies. This subjective test can also be quantitated by using an ultrasound.

A rigid/flexible foot type is the most common type seen in mechanical metatarsalgia.

Case Study 2: 44-year-old female with chronic debilitating plantar third metatarsal pain

A 44-year-old female presented to the clinic with severe debilitating pain under the third metatarsal. She described the pain as sharp and and worsening throughout the day. Her job requires eight hours of standing and her responsibilities were becoming more difficult for her. She had undergone treatment with

Continued on page 142

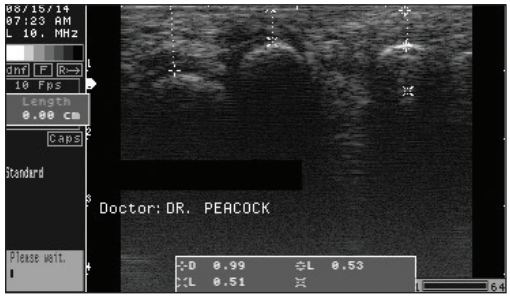

Figure 6: Ultrasound view pre-operatively.

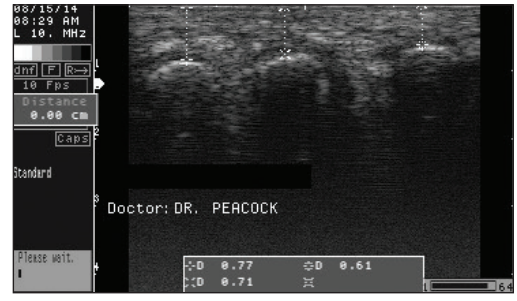

Figure 7: Ultrasound view intra-operatively following lesser 2nd, 3rd, and 4th metatarsal osteotomies

Peacock Press Test *(from page 140)*

orthotics, cortisone injections, anti-inflammatories, and shoe padding. All of these conservative measures were ineffective. She displayed a painful IPK plantar third metatarsal. This case illustrates pre-operative, intra-operative, and post-operative use of the Peacock press technique described in this article. The patient submitted to lesser metatarsal osteotomies of the second, third, and fourth metatarsals to alleviate her pain. She was able to return to work full-time in three months with complete relief of pain.

Figure 6 shows the ultrasound view pre-operatively. Figure 7 and 8 show the immediate ultrasound view intra-operatively following lesser metarsal osteotomies second, third and fourth. Figure 9 is the ultrasound view of the patient at five months post-op.

Figure 8: Peacock press intra-operatively.

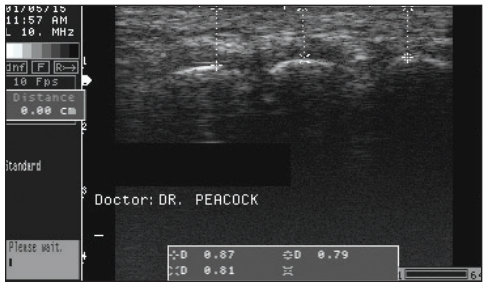

Figure 9: Ultrasound, five months post-op.

Figure 10: Stress fracture eight weeks status-post bunionectomy with Akin osteotomy.

Figure 11: Secondary bone healing in the second metatarsal fracture.

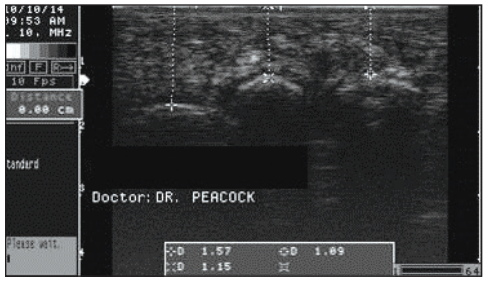

Figure 12: Peacock press with ultrasound diagnostic imaging, pre-op.

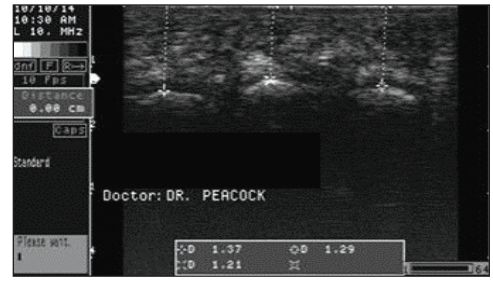

Figure 13: Peacock press ultrasound image post-op 3rd and 4th metatarsal osteotomies.

Case Study 3: Second metatarsal fracture in a 57-year-old patient status post-bunionectomy with Akin osteotomy

The author performed a bunionectomy with Akin osteotomy on this 57-year-old female who developed a stress fracture eight weeks status post-surgical correction (Figure 10). Treatment of this complication consisted of immobilization with a CAM walker to allow secondary bone healing in the second metatarsal fracture (Figure 11). The fracture healed as expected and the patient began to experience pain in the third metatarsal. The result of this complication was then viewed utilizing the Peacock Press with ultrasound diagnostic imaging (Figure 12).

Subsequently, the patient underwent metatarsal osteotomies of the third and fourth metatarsals, and the patient went on to complete resolve in pain (Figure 13). The patient was able to resume normal activities nine weeks following the metatarsal osteotomies. The Peacock press was instrumental in determining how to handle this post-operative complication. The author also feels that if he would have utilized the test in the initial surgery, a greater appreciation of the second metatarsal position as it relates to the first ray instability could have been determined.

Future Use

Because the exam helps quantify the level of the metatarsals following surgical treatment with osteotomies, it can be used as a way to compare surgical outcomes of isolated metatarsal osteotomies versus multiple metatarsal osteotomies. The author believes that the test can be used to determine the fat pad depth range needed to prevent transfer lesions.

Continued on page 143

Peacock Press Test *(from page 142)*

The author's goal is to continue using the test and to obtain data for such scientific presentation.

Last Thoughts

The Peacock press test can be employed to determine the effect of gastrocnemius recession on the retrograde plantarflexory position of the metatarsals. For example, an interesting study would be to examine the fat pad depth relative to the metatarsal positions post-gastrocnemius recession by modifying the test to include the necessary 10° ankle dorsiflexion required during gait. In fact, it is possible that utilizing the Silfverskoid test along with the Peacock press simultaneously will give a better indication of true equinus.

The author believes that functional foot typing is a great starting point for profiling feet in cases of metatarsalgia. When combined with The Peacock press, practitioners are armed with examination tools that predict surgical and conservative options when faced with metatarsalgia complaints. Additionally, viable options in determining metatarsal levels intra-operatively more accurately will lead to better outcomes and fewer complications.

It is the author's hope that this simple test will lead to a better understanding of the complicated issues related to metatarsalgia. In the meantime, to evaluate metatarsalgia, place the patient in the Peacock press, grab an ultrasound, and you will get immediate feedback with a simple test that generates a vast potential to improve your outcomes. **PM**

References

[1] De Prado M. Minimally Invasive Foot Surgery 2009, Chapter 10, p. 179.

[2] Leventeen EO, Pearson SW. Distal metatarsal osteotomy for in tractable plantar keratosis. Foot Ankle 1990; 10:247-51.

[3] Weissman SD: Radiology of the Foot. Baltimore, Williams & Wilkins, 1983 pp13-37.

[4] M. Orlin and T. McPoil ; Plantar Pressure Assessment. Physical Therapy April 2000; Vol 80 No. 399-409.

[5] Shavelson, Dennis: The Functional Foot Typing Forefoot Examination; The Foot in Close Chain, Present Podiatry,Ezine 03/29/10.

[6] Root ML, Orien WP, Weed-JH,Hughes RJ. Biomechanical Examination of the Foot, Volume 1. Clinical Biomechanics Corporation, Los Angeles, 1971.

Dr. Peacock has been in private practice for 18 years in Whiteville, NC. He was traditionally trained in a podiatric surgical residency. He is an assistant professor in the Academy of Ambulatory Foot and Ankle Surgery and is a diplomate of the American Board of Foot and Ankle Surgery.