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SCIENTIFIC CONFERENCE  
**ACFAS Vegas**  
MONDAY, FEBRUARY 27 - THURSDAY, MARCH 2, 2017  
THE MIRAGE HOTEL AND CASINO | LAS VEGAS

### 2017 Manuscript Awards of Excellence Competition Winners

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**Does Second Metatarsal Length Correlate with Plantar Pressure Measurements Beneath the Second Metatarsophalangeal Joint During Walking?**

2<sup>nd</sup>

**Development and Validation of the Foot Union Scoring Evaluation Tool (FUSET) for Arthrodesis of Foot Structures**

3<sup>rd</sup>

**Diabetes is Not Significantly Associated with an Increased Risk of Venous Thromboembolism After Foot or Ankle Surgery; a Retrospective Review of 5,216 Patients**

#### **Honorable Mentions:**

- **Risk Factors for Recurrence after Hammertoe Corrective Surgery**
- **Comparison of Tibial Sesamoid Position on Anterior Posterior and Axial Radiographs Before and After Tri-Plane Tarsal Metatarsal Joint Arthrodesis**
- **Experimental Comparison of the Clinical Measurement of Ankle Joint Dorsiflexion and Radiographic Tibiotalar Position**
- **Sagittal Ankle and Midfoot Range of Motion Before and After Revision Total Ankle Replacement: A Retrospective Comparative Analysis**

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- Peri-Operative Complications and Initial Alignment of Lateral Approach Total Ankle Arthroplasty
- Long-term Pathological Gait Pattern Changes After Talus Fractures – Task Specific, Dynamic Gait Analysis with the First Fully Integrated Continuous Pedobarography Tool
- Hindfoot Endoscopy for Posterior Ankle Impingement Syndrome: Is There a Correlation Between Radiographs or Physical Exam with Intraoperative Findings?
- No Difference in Anterior Ankle Incision Wound Complications Between Total Ankle Replacement and Ankle Arthrodesis
- Anatomic Feasibility of Distal Fibula Bicortical Screw Fixation with Lateral Neutralization Plating
- Analysis of Two Different Arthroscopic Broström Repair Constructs for Treatment of Chronic Lateral Ankle Instability in 110 Patients: A Retrospective Review
- Foot and Ankle Fellowship Training in Podiatric Medicine and Surgery: A National Survey Comparison of Fellowship Trained and Non-Fellowship Trained Podiatric Surgeons: Part 2: Objective Measures

### **Innovation in Hallux Valgus and Hammertoe Surgeries**

- Intermediate Term Clinical and Patient Perceived Outcomes of the Dorsal Approach Plantar Plate Repair
- Early Weightbearing Following Arthrodesis of the First Metatarsal-phalangeal Joint: A Systematic Review
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- Structures at Risk with Plantar Approach Retrograde First Metatarsal Charcot Beam Screw Insertion: A Cadaveric Study
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## Does Second Metatarsal Length Correlate with Plantar Pressure Measurements Beneath the Second Metatarsophalangeal Joint During Walking?

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Shenche Hshieh, PharmD, MS  
Ryan T. Crews, MS  
Jacob M. Jones, BS  
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Adam E. Fleischer, DPM, MPH, FACFAS

### Abstract:

Plantar plate injury and gradual subluxation of the second metatarsophalangeal joint is a relatively common phenomenon and a source for significant impairment of the forefoot. The structures of the metatarsophalangeal joints in addition to the extrinsic and intrinsic muscles function to stabilize the metatarsophalangeal joints and resist plantar forces. Deterioration of the plantar plate has become a focus as it plays a major role in the progression of the overall deformity.

The present study aimed to clarify whether the relative and/or absolute length of the second metatarsal is associated with increased plantar pressure measurements. A retrospective analysis of weightbearing radiographic studies and pedobarographic data from 100 consecutive patients was assessed for predetermined angular relationships and four different metatarsal protrusion measurements.

The absolute length of the second metatarsal was significantly associated with the maximum force ( $R=.299$ ,  $p=0.00$ ) and the force-time integral ( $R=0.316$ ,  $p=0.001$ ) under the second metatarsal head, although this was not maintained in final linear regression models when accounting for weight. The relative length of the second to first metatarsal was significantly associated with the ratio of peak pressure ( $R=0.243$ ,  $P=0.015$ ). The relative length of the second to the third metatarsal was significantly associated with the ratios of peak pressure ( $R=0.292$ ,  $P=0.003$ ), pressure-time integral ( $R=0.249$ ,  $P=0.013$ ) and force-time integral ( $R=0.221$ ,  $P=0.028$ ).

Our results indicate that the length of the second metatarsal had a positive association with the load accepted during ambulation. This suggests that an elongated second metatarsal likely contributes to plantar plate injuries and may benefit from being addressed (i.e., shortened) in patients who are undergoing surgical repair for plantar plate injuries.

**Level of Clinical Evidence: II**



## Development and Validation of the Foot Union Scoring Evaluation Tool (FUSET) for Arthrodesis of Foot Structures

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Jeremy J. Cook, DPM, MPH, FACFAS  
Emily A. Cook, DPM, MPH, FACFAS  
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Michael R. Matthews, DPM  
Daniel D. Hansen, DPM  
Byron Collier, DPM  
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### Abstract:

Reliable evaluation of osseous consolidation following pedal arthrodesis can be difficult and radiographic healing often dictates care. Plain radiographs remain the mainstay imaging tool due to cost, efficiency and radiation exposure. Applying radiographic parameters which reliably determine osseous healing is essential. Yet, there is currently no reliable or validated means to determine osseous union of any joint in the foot or ankle.

The purpose of this study was to develop a radiographic healing scoring system that would enhance the diagnostic healing assessment following joint arthrodesis of the foot or ankle.

We adapted several existing scales previously validated for fracture healing in the leg, since no study has ever attempted to apply this to a joint fusion model. 150 cases were evaluated by 6 blinded assessors to test the interrater reliability of subjective healing assessment compared to the proposed scoring system. Radiographs were classified by post-operative period:  $\leq 4$  weeks, 5-12 weeks, and  $>12$  weeks. The initial proposed scale was found to have high interrater reliability but was burdensome. Using *a priori* item reduction protocols, a limited 5 item scale further improved internal consistency while reducing burden.

The result was excellent interrater reliability ( $\alpha = 0.978$ ,  $SD = 0.02$  95% CI [0.96-0.99]) among all assessors as compared to reduced reliability ( $\alpha = 0.752$ ) for subjective arthrodesis healing. Intrarater reliability was also found to be superior via a test-retest method. Reliability of this system appeared superior to subjective assessment of arthrodesis healing even in the absence of clinical correlates following foot arthrodesis.

**Level of Evidence: 1**



## **Diabetes is Not Significantly Associated with an Increased Risk of Venous Thromboembolism After Foot or Ankle Surgery; a Retrospective Review of 5,216 Patients**

Craig K. Udall, DPM, AACFAS

Caleb McFerren, DPM

Erik Monson, DPM

### **Abstract:**

Introduction: Venous Thromboembolism (VTE) is a blood clotting disease, including deep vein thrombosis (DVT) and pulmonary embolism (PE). Risk of VTE after foot and ankle surgery is low, unless there are certain risk factors. Diabetes is one potential unproven risk factor for VTE. The working hypothesis is that a patient's risk for developing VTE after foot or ankle surgery increases if they are diabetic.

Methods: 5216 patient charts were retrospectively reviewed from the years 2000 to 2015, from 5 podiatric surgeons at the host academic medical center. ICD 9 codes to diagnose VTE were used to help identify all foot or ankle surgeries in which the patient developed a VTE within 3 months. Diabetes was evaluated as a potential risk factor. Other risk factors were evaluated.

Results: The incidence of VTE was 0.6% (33/5216). 1596 (30%) of the 5216 total patients were diabetic. 10 (30%) of the 33 VTE patients were diabetic at the time of surgery. The incidence of VTE in diabetics was 0.6% (10/1596). Diabetes was not associated with an increased risk of VTE development ( $p=0.97$ , OR 0.99, 95% CI 0.47-2.09). Average VTE onset was 3.5 weeks post op.

Conclusion: Diabetes previously has been identified as a potential risk factor for VTE development. The present study results do not associate diabetes with VTE development after foot or ankle surgery ( $P<0.05$ ). In this series, the incidence of VTE after foot or ankle surgery was low, and consistent with existing literature (0.6%). Ankle arthroscopy was significantly associated with VTE.

**Level of Evidence:** III. Retrospective Case Series

## Honorable Mention

### Risk Factors for Recurrence after Hammertoe Corrective Surgery

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Jacob Randich, BS

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Erin E. Klein, DPM, MS, FACFAS

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#### Abstracts:

Hammertoe corrective surgery is perhaps the most commonly performed surgery in the foot, yet recurrence and revision rates following the procedure remain high. In this study we aimed to identify patient and provider risk factors associated with developing suboptimal outcomes within a large, urban-based, foot and ankle specialty practice.

Consecutive patients who underwent elective hammertoe surgery for the second, third and/or fourth toes between January 1, 2011 and December 31, 2012 served as the basis of this retrospective cohort study. Medical charts, operative reports, and preoperative and postoperative x-rays were reviewed to identify potentially important risk factors. Suboptimal outcomes were defined as either symptomatic recurrence or need for revision surgery. Stepwise Cox proportional hazards regression was then used to identify important predictor variables. One hundred twelve patients (209 toes) with mean age of  $60.8 \pm 11.2$  years and mean follow up of  $29.5 \pm 21.2$  months were included.

Magnitude of transverse plane deformity of the operative toe (hazards ratio 1.04 [95% CI 1.02-1.06]), operative toe = second toe (vs. third or fourth) (hazards ratio 3.04 [95% CI 1.52-6.09]), and use of soft tissue only surgical technique or middle phalangectomy for proximal interphalangeal joint reduction (hazards ratio 3.69 [95% CI 1.42-9.63]) were identified as important risk factors in the final Cox model. These findings may provide guidance for foot and ankle surgeons during office consultations and better equip patients with appropriate postoperative expectations when contemplating elective hammertoe surgery.

**Level of clinical evidence:** Prognostic, level 3

## Honorable Mention

### Comparison of Tibial Sesamoid Position on Anterior Posterior and Axial Radiographs Before and After Tri-Plane Tarsal Metatarsal Joint Arthrodesis

Paul D. Dayton, DPM, MS, FACFAS

Mindi J. Feilmeier, DPM, FACFAS

#### Abstract:

We reviewed the radiographic results of a group of patients undergoing tri-plane correctional tarsal-metatarsal arthrodesis for symptomatic hallux abducto valus with metatarsus primus aducto valgus. At a mean follow-up of  $5.2 \pm 1.6$  months, a significant improvement of tibial sesamoid position on both AP and axial radiographs was measured.

A negative metatarsal round sign, indicating correction of frontal-plane metatarsal rotation, was observed in 20 of the 21 feet (95.2%) based on AP radiographic measurement. All of the patients obtained neutral coronal plane rotation and resolution of sesamoid subluxation on sesamoid axial at final follow-up (100%) indicating complete frontal plane correction.

The sesamoid axial position was consistently normal when the round sign was absent, and the TSP was in the normal range of 2 on AP radiograph. Sesamoid subluxation from the normal position with the tibial sesamoid on or lateral to the crista was noted in 4 (19%) feet preoperative and 0 feet postoperative. 16 of the 21 feet had metatarsal pronation preoperatively (76.2%).

Evaluation confirms that lateral round sign of the first metatarsal head and high tibial sesamoid position noted on AP radiograph is related to metatarsal pronation and can be corrected with frontal plane rotation as part of the procedure.

**Level of Evidence:** IV Therapeutic

## Honorable Mention

### Experimental Comparison of the Clinical Measurement of Ankle Joint Dorsiflexion and Radiographic Tibiotalar Position

Mindi Feilmeier, DPM, FACFAS  
Paul Dayton, DPM, MS, FACFAS  
Kalani Parker, BS  
Riane Otti, BS  
Rachel Reimer, PhD  
Merrell Kauwe, DPM  
Jake Eisenschink, BS  
Joshua Wolfe, BS

#### Abstract:

Limited ankle joint range of motion can lead to mechanical compensation in the foot and instigate a variety of foot pathologies. Clinical measurement of ankle dorsiflexion is typically used to diagnose limited ankle range of motion and diagnose equinus.

There remains controversy regarding the most accurate clinical means of measuring ankle joint dorsiflexion and the effect that foot position has on true talar-tibial position. It is known that variations in foot position can affect the perceived degree of ankle dorsiflexion with supination and pronation both changing the measured values.

We investigated the effects of supinated, neutral and pronated foot positions on clinical measurements in 50 healthy subjects, by three clinicians of varied skill levels. We also measured true talar-tibial joint motion on radiographs and compared this to the clinical measurements.

The results of our clinical measurements showed supination was a more reliable method of measurement with a higher internal consistency. There were statistically significant differences in ankle dorsiflexion measurements with the foot in a supinated, neutral and pronated positions with supination showing a smaller degree of clinical dorsiflexion measurement. Radiographic measurements of talar-tibial position showed very little change during assessment of the three foot positions in the same subjects.

We have confirmed that despite increased degree of dorsiflexion measured clinically in a pronated rather than a supinated foot, the true change in ankle joint position on radiographs was minimal.

**Level of Clinical Evidence:** III Diagnostic

## Honorable Mention

### Sagittal Ankle and Midfoot Range of Motion Before and After Revision Total Ankle Replacement: A Retrospective Comparative Analysis

Peter J. Hordyk, DPM

Brent A. Fuerbringer, DPM

Thomas S. Roukis, DPM, PhD, FACFAS

#### Abstract:

The most common reason for a revision total ankle replacement procedure is a painful, stiff ankle even after the initial surgery. There is limited and conflicting data regarding the change in sagittal foot and ankle range of motion following revision total ankle replacement surgery. We sought to determine if revision total ankle replacements would reduce compensatory midfoot range of motion.

In determining this, a novel radiographic measurement system that employs stable osseous landmarks is utilized. A retrospective chart review of patients who had undergone revision total ankle replacement between January 2009 and June 2016 was performed.

Thirty-one patients/ankles underwent revision total ankle replacement surgery and met inclusion criteria with a mean follow-up of  $23.1 \pm 12.5$  (Range: 2-46.5) months. Investigation of preoperative and postoperative weightbearing lateral radiographic images was performed to determine global foot and ankle, isolated ankle, and isolated midfoot sagittal range of motion.

Statistical analysis revealed a significant increase in ankle (p-value: 0.02) and a significant decrease in midfoot range of motion (p-value: <0.001) from preoperative to postoperative state. The change in global foot and ankle range of motion was not significant (p-value: 0.63). For this patient population, the increased ankle range of motion effectively resulted in less compensatory midfoot range of motion.

**Level of Evidence:** Level 3 (Retrospective comparative study)

## **The Ankle**

### **Peri-Operative Complications and Initial Alignment of Lateral Approach Total Ankle Arthroplasty**

J. George DeVries, DPM, FACFAS

Todd Derksen, DPM, FACFAS

Brandon M. Scharer, DPM, FACFAS

Robert Limoni, MD

#### **Abstract:**

Total ankle replacement continues to become a more common approach to end-stage arthritis. A lateral approach total ankle implant system is a novel approach to this treatment. A retrospective report of 16 patients treated with lateral approach total ankle replacement is reported here.

The implant was successful and retained in all cases over a follow-up of 615.9 days  $\pm$  231.5 days. Initial satisfactory alignment was achieved in all cases. In cases in which there was pre-operative frontal plane incongruent deformity pre-operatively, a statistically significant correction was obtained ( $p=0.0122$ ). There were 3 delayed or nonunions of the fibula (18.8%), and one case of infection that lead to removal, leaving a total of 4 complications (25.0%) related to the fibular osteotomy.

This report indicates that lateral approach total ankle replacement is effective with unique advantages and disadvantages for end stage ankle arthritis.

**Level of Evidence:** Therapeutic Level 4: Case Series

## **Long-term Pathological Gait Pattern Changes After Talus Fractures – Task Specific, Dynamic Gait Analysis with the First Fully Integrated Continuous Pedobarography Tool**

Benedikt J. Braun, MD  
Eva-Marie Braun, MD  
Patrick Pelz  
Nils T. Veith, MD  
Marcel Orth, MD  
Moritz Klein, MD  
Steven C. Herath, MD  
Jörg H. Holstein, MD  
Tim Pohlemann, MD

### **Abstract:**

#### **Introduction**

Talus fractures are rare and challenging to treat. Studies describe mediocre results with high rates of osteonecrosis and arthritis. Aim of the current study was to describe long-term gait changes after talus fractures, identify patterns associated with poor outcome and discuss possible treatment options based on gait analysis.

#### **Methods**

Twenty-seven patients were followed-up clinically and via gait analysis after talus fractures. Continuous dynamic pedobarography was performed on a standardized parcours consisting of different gait tasks and matched to the outcome.

#### **Results**

Mean follow-up was 78.3 months (range 21-150), mean AOFAS and Olerud-Molander scores 66 (range 20-100) and 54 (range 15-100). Significant correlation between fracture classification and osteoarthritis (Hawkins:  $r_s=0.67$  / Marti-Weber:  $r_s=0.5$ ;  $p<0.05$ ), as well as several gait differences between injured and healthy side with correlations to outcome were seen: decreased step load-integral/maximum load; associations between center of pressure displacement and outcome, as well as between temporospatial measures and outcome. Overall pressure-distribution was lateralized in patients with subtalar joint injury ( $0.51\pm 1.1$  vs.  $1.09\pm 0.9$  N/cm<sup>2</sup>;  $p<0.05$ ).

#### **Conclusion**

Talus fractures lead to chronic gait changes and restricted function. Dynamic pedobarography can identify patterns associated with poor results. The results suggest that these changes could be addressed by physical therapy and customized orthoses to improve overall outcome. Follow-up studies based on the introduced measurement protocol could further elucidate the clinical impact of dynamic pedobarography.

**Level of Clinical Evidence:** Level 2, retrospective, prognostic study

## **Hindfoot Endoscopy for Posterior Ankle Impingement Syndrome: Is there a Correlation between Radiographs or Physical Exam with Intraoperative Findings?**

Rachel B. Kang, DPM

Thomas S. Roukis, DPM, PhD, FACFAS

Andrew D. Elliott, DPM, JD

### **Abstract:**

Endoscopy has been used for the last two decades to treat posterior ankle impingement syndrome. We reviewed the medical records of 21 patients [10 men, 11 women] mean age 29 years [Range: 13-54 years] who underwent isolated hindfoot endoscopy for posterior ankle impingement syndrome between 2011 and 2016. Physical exam and preoperative radiographs were analyzed to determine if a correlation existed between preoperative findings and pathology identified intraoperatively.

Using our results, a radiographic classification system was developed. On standard lateral radiographs two zones were created for the location of the flexor hallucis longus muscle belly shadow and two-dimensional measurements of Stieda's process were obtained.

Analysis was performed via the Wilcoxon Two-Sample Test and Fisher's Exact Test. Results demonstrated a correlation between location of the flexor hallucis longus muscle belly and size of the Stieda's process. The larger Stieda's process had a more proximal muscle belly within zone 2 whereas the smaller Stieda's process had a more distal muscle belly extending into zone 1. There was a statistically significant relationship for zone 1 flexor hallucis longus muscle belly and low-lying flexor hallucis longus muscle belly noted intraoperatively [p-value < 0.05].

Only one physical exam finding, posterior ankle pain with dorsiflexion and simultaneous resisted plantarflexion of the hallux, had statistical significance [p-value < 0.05] with intraoperative finding of impingement of flexor hallucis longus tendon against the Stieda's process. This novel radiographic classification system can assist in differentiating between osseous and soft-tissue etiology for posterior ankle impingement syndrome when physical exam findings are ambiguous.

**Level of Clinical Evidence:** Retrospective Diagnostic study (Level 4)

## **No Difference in Anterior Ankle Incision Wound Complications Between Total Ankle Replacement and Ankle Arthrodesis**

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Gregory C. Berlet, MD

### **Abstract:**

The anterior incision is commonly used for total ankle replacement (TAR) and ankle arthrodesis. The anterior incision has demonstrated a high incidence of complications.

The purpose of this study was to evaluate the incisional healing and complications of the anterior approach for these two procedures. This was a retrospective review of wound healing and other complications among 304 patients who underwent primary TAR or ankle arthrodesis via the anterior approach between August 2011 and August 2015.

Of those patients, 191 (62.8%) underwent TAR and 113 (37.2%) underwent arthrodesis. The mean follow-up was 11.8 months. A subgroup analysis was performed comparing 91 TAR patients matched to an equal number of ankle arthrodesis patients based upon gender, age, diabetes, and smoking status.

Overall, 19.7% of patients experienced delayed wound healing greater than 30 days, 15.8% required office-based wound care, 12.2% had a wound infection, 15.1% were prescribed antibiotics, 9.5% underwent wound debridement in the office, 4.6% had nerve injury, 0.7% had a vascular injury, and 10.5% required implant revision or removal. Although the TAR and arthrodesis subgroups had dissimilar demographics, there was no difference in outcomes. However, between the matched pairs, there again was no difference in outcomes.

Among this large cohort of patients, short term postoperative complication rates were constant at all levels of analysis. This suggests that the primary determinates of complications were neither the demographic nor implant factors considered herein. Further work is needed to identify the modifiable risk factors associated with the anterior ankle incision.

**Level of Evidence:** Level 3

## **Anatomic Feasibility of Distal Fibula Bicortical Screw Fixation with Lateral Neutralization Plating**

Laura E. Sansosti, DPM

Andrew J. Meyr, DPM FACFAS

### **Abstract:**

Supination-external rotation mechanism fractures of the distal fibula are the most commonly encountered ankle fracture pattern. A common technique for fixation of these fractures is by means of an interfragmentary compression screw and laterally positioned neutralization plate. Conventionally, at least three bicortical screws are positioned through the plate into the fibula proximal to the fracture with 2 unicortical screws positioned through the plate into the fibula distal to the fracture. However, classic fixation technique dictates that at least 3 or 4 cortices should be purchased through a neutralization plate distal to a fracture fragment.

The objective of this investigation was to examine the anatomic feasibility of distal fibula bicortical fixation with lateral neutralization plating. A specific screw insertion technique was performed on a consecutive series of 81 embalmed cadaveric intact ankle mortises.

The length of the most distal screw measured a mean  $\pm$  standard deviation (range) of  $20.44 \pm 2.49$ mm (14-26mm) with an extra-articular terminus in 95.06% of specimens. The length of the second most distal screw measured a mean  $\pm$  standard deviation (range) of  $19.68 \pm 3.02$ mm (12-28mm) with an extra-articular terminus in 100% of specimens.

This study confirms the results of a previous investigation with utilization of a larger cohort and with an intact ankle mortise construct. We have also provided some basic descriptive statistics of appropriate screw lengths. The results of this investigation provide evidence that bicortical distal fibula fixation in accordance with fixation principles is anatomically possible and feasible with a one-third tubular plate.

**Level of Clinical Evidence: 4**

## **Analysis of Two Different Arthroscopic Broström Repair Constructs for Treatment of Chronic Lateral Ankle instability in 110 Patients: A Retrospective Review**

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Joseph Baker, DPM, AACFAS  
Britton S. Plemmons, DPM, AACFAS

### **Abstract:**

Chronic lateral ankle instability is a common condition treated by most foot and ankle surgeons. Once conservative treatment fails, patients often undergo surgical reconstruction, either anatomic or nonanatomic.

The present retrospective cohort study compared the clinical outcomes of two different arthroscopic brostrom procedures. 110 patients were treated with one of the two lateral ankle stabilization techniques from October 1, 2014 to December 31, 2015. Seventy five patients were included in the arthroscopic lateral ankle stabilization group using an additional suture anchor proximally and 35 patients in the arthroscopic lateral ankle stabilization group using the knotless design. 83(75.5%) were female and 27(24.5%) male. The age of the cohort was  $46.05 \pm 17.89$  (12-83) years. Body mass index (BMI) was calculated as  $30.03 \pm 7.42$  (18.3-52.5)  $\text{kg}/\text{m}^2$ . There were 25 (22.7%) patients who had concomitant procedures performed during lateral ankle stabilization.

Overall, postoperative complications occurred in 14 (12.7%) patients. No statistical differences were found between the two groups regarding complication rates, use of concomitant procedures, presence of diabetes and workers compensation. There was no statistically significant difference in the mean age, BMI or gender distribution between the two groups. Preoperative AOFAS scores were  $50.85 \pm 13.56$  (18-76) and  $51.26 \pm 13.32$  (18-69) in Groups 1 and 2, respectively. Postoperative AOFAS scores were  $88.19 \pm 10.72$  (54-100) and  $84 \pm 15.41$ (16-100) in Groups 1 and 2, respectively.

No statistically significant difference was found between these two groups. Preoperative VAS was  $7.45 \pm 1.39$  (3-10) and  $6.97 \pm 1.25$  (5-10), which improved to  $1.12 \pm 1.38$  (0-5) and  $1.8 \pm 1.98$  (1-9) postoperatively for Group 1 and 2, respectively. The postoperative VAS between groups 1 and 2 was found to be statistically significant. Preoperative and postoperative AOFAS, FFI and Karlsson-Peterson score showed no statistical difference between the two groups.

From our experience, either procedure is an acceptable treatment option for chronic lateral ankle instability with the knotless technique trending towards more complications.

**Level of Evidence: IV**

## **Foot and Ankle Fellowship Training in Podiatric Medicine and Surgery: A National Survey Comparison of Fellowship Trained and Non-Fellowship Trained Podiatric Surgeons: Part 2: Objective Measures**

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Nicole Protzman, MS

Stephen A. Brigido, DPM, FACFAS.

### **Abstract:**

This report evaluated the objective pros/cons of surgical foot and ankle fellowships. A two-part fellowship assessment survey was designed and sent to 135 podiatric surgeons.

Forty-six fellowship trained and 46 non-fellowship trained surgeons met the inclusion/exclusion criteria. There were significant differences in types of practices joined at the completion of training ( $P = 0.004$ ), with fellowship-trained surgeons joining multi-practitioner podiatry groups or orthopedic/musculoskeletal groups, and non-fellowship-trained surgeons joining multi-practitioner podiatry groups.

Fellowship trained respondents reported significantly higher initial salary ( $P = 0.013$ ), benefit opportunities ( $P < 0.001$ ), and academic appointments/affiliations ( $P = 0.006$ ). During the first two years of practice, significantly more billable procedures were reported by fellowship trained respondents ( $429.0 \pm 395.7$  versus  $211.7 \pm 344.2$ ,  $P = 0.019$ ). Percentage of forefoot surgical cases was significantly greater for non-fellowship trained surgeons ( $56.4 \pm 26.1\%$  versus  $39.4 \pm 21.1\%$ ) while percentage of rearfoot, ankle, and trauma surgical cases were significantly greater for fellowship trained surgeons ( $27.1 \pm 12.8\%$  versus  $20.7 \pm 12.6\%$  and  $22.6 \pm 14.2\%$  versus  $16.1 \pm 12.1\%$  and  $19.8 \pm 14.5\%$  versus  $13.1 \pm 11.6\%$ ).

The percentage of practice dedicated to diabetic foot care was significantly greater for non-fellowship trained surgeons ( $23.7 \pm 17.1\%$  versus  $14.2 \pm 13.8\%$ ), while the percentage of practice dedicated to sports medicine and surgery was significantly greater for fellowship trained surgeons ( $27.7 \pm 13.9\%$  versus  $21.9 \pm 11.8\%$  and  $44.2 \pm 17.8\%$  versus  $34.0 \pm 20.8\%$ ).

This study provides valuable insight for young practitioners considering fellowship training and for the entire profession.

**Level of Clinical Evidence: 5**

## **Innovation in Hallux Valgus and Hammertoe Surgeries**

### **Intermediate Term Clinical and Patient Perceived Outcomes of the Dorsal Approach Plantar Plate Repair**

Erin E. Klein, DPM, MS, FACFAS

Lowell Weil, Jr., DPM, FACFAS

Jeffrey R. Baker, DPM, FACFAS

Adam E. Fleischer, DPM, MPH, FACFAS

#### **Abstract:**

The plantar plate is a small structure in the forefoot that is important in the stability of the lesser metatarsophalangeal (MTP) joints. Despite the increase in literature related to proper diagnosis, outcomes of the procedure have not been readily reported. Therefore, the purpose of this investigation was to analyze the results of a cohort of consecutive patients who have undergone surgical correction of forefoot pain with a dorsal approach plantar plate repair.

The institutional database was reviewed for consecutive patients of two reconstructive surgeons who underwent a dorsal approach plantar plate repair that was isolated. Patients were included if medical records were complete and Foot and Ankle Outcome Scores (FAOS) scores were available for analysis. Patients were excluded if any other procedure was performed on the foot or if any needed information was not available. Variables were compared utilizing a paired student t-test with 0.05 set as the level for significance.

53 consecutive patients (50 women, 3 men) presenting for surgical correction of the 2nd MTP joint with an average of  $2 \pm 0.4$  year follow up were analyzed. Pre-operative visual analog scale for pain scores decreased from an average of  $6.5 \pm 1.5$  (range: 4-10) to an average of  $1.5 \pm 0.5$  (range: 0-4). All measured clinical parameters were significantly different ( $p < 0.05$ ) when the pre-operative exam was compared to the post-operative exam. FAOS scores improved significantly in 4 of 5 subscales at final follow up exam.

The dorsal approach plantar plate repair is a surgical procedure that decreased pain and restored function in this cohort of patients. The improvement in patient's clinical exam and patient reported outcome measures was maintained over the 2 year period during which this data was collected. This affirms the notion that repair of the plantar plate is a surgical procedure that should maintain its place in the surgical algorithm of treatment of forefoot metatarsalgia.

**Level of clinical evidence:** Therapeutic level 4

## **Early Weightbearing Following Arthrodesis of the First Metatarsal-phalangeal Joint: A Systematic Review**

Amanda L. Crowell, DPM

Jennifer C. Van, DPM, AACFAS

Andrew J. Meyr, DPM, FACFAS

### **Abstract:**

Arthrodesis of the first metatarsal-phalangeal joint is a reliable and power surgery for correction of both the hallux limitus/rigidus and severe hallux abductovalgus deformities. However, one potential contraindication to the procedure is the extended period of non-weight bearing immobilization typically associated with the post-operative course.

The objective of this investigation was to perform a systematic review of the incidence of non-union following early weight bearing in patients undergoing arthrodesis of the first metatarsal-phalangeal joint. We performed a review of electronic databases with the inclusion criteria of retrospective case series', retrospective clinical cohort analyses, and prospective clinical trials with  $n \geq 15$  feet, a mean follow-up period of  $\geq 12$  months, a postoperative early weight bearing protocol (defined as  $\leq 2$  weeks), a clear description of the fixation construct, a reported incidence rate of non-union, and patients undergoing primary surgery for hallux valgus or hallux limitus/rigidus.

Seventeen studies met our inclusion criteria with a total of 898 feet analyzed. Of these, 57 (6.35%) were described as developing a non-union. This would likely be considered an acceptable rate of non-union when considering this procedure and might indicate that arthrodesis of the first metatarsal-phalangeal joint does not always require an extended period of non-weight bearing post-operative immobilization.

**Level of Evidence: 4**

## **Digital Implant Hammertoe Correction: Osseous and Fibrous Union Rates and Their Clinical Relevance**

Nathan S. Shane, DPM  
Michael Zimmerman, DPM  
Andrew Brown, DPM  
John White, DPM  
Zachary Rasor, DPM  
Bryan J. Hall, DPM, FACFAS

### **Abstract:**

Advancements have been made in technologies used for the surgical treatment of hammertoe deformities. The purpose of the present study was to identify the union rates for implant proximal interphalangeal (PIP) joint arthrodesis and their associated clinical relevance.

Eighty-seven (87) procedures where digital implant devices were used for PIP joint arthrodesis were retrospectively evaluated. Radiographs were reviewed immediately post-operatively, three months, and twelve months post-operatively. Osseous union was defined as bony bridging of at least three (3) cortices. Patients were categorized as being symptomatic or asymptomatic based on both subjective and objective exam findings post-operatively. Post-operative complications were defined as implant failure, deformity recurrence, or deep infection requiring implant removal. The same surgical approach was used for each implant PIP joint arthrodesis by the same surgeon.

Our results revealed overall osseous and fibrous union rates of 48.3% and 51.7%, respectively. The second digit had the highest incidence of osseous union, whereas the fourth digit had the highest incidence of fibrous union. There were a total of 3 (3.4%) complications. A total of 2 out of 87 (2.3%) digits were considered symptomatic and required implant removal.

Few reports exist that have documented the union rates and clinical correlation for digital implant arthrodesis. The findings of the present study indicate that implant PIP joint arthrodesis is an effective treatment method at achieving stable, asymptomatic union with a low complication rate.

**Level of Evidence: IV**

## **Patient Reported Outcomes Among Older Adults after Simultaneous Bilateral Hallux Valgus Surgery and Unilateral Surgery**

Keith N. Arbuckle, DPM

Neema Patel, BS

Rital Shah, BS

Erin E. Klein, DPM, MS, FACFAS

Lowell Weil, Jr., DPM, FACFAS

Lowell Scott Weil, Sr., DPM, FACFAS

Adam E. Fleischer, DPM, MPH, FACFAS

### **Abstract:**

**Background:** It is unclear whether patient perceived outcomes after bilateral simultaneous scarf bunionectomy are comparable to those seen in unilateral surgery for older adults.

**Methods:** We conducted a retrospective review identifying patients aged 50 years and older who had undergone a scarf bunionectomy by the study's senior authors between 2012 and 2014. Included subjects had to have preoperative and at least 12 month postoperative Foot and Ankle Outcome Scores (FAOS) available for their foot. Radiographic correction and complication rates were assessed for the two groups. The postoperative protocol was the same for unilateral and bilateral groups. After a scarf bunionectomy was performed, patients were allowed to be immediately weight bearing in a surgical shoe. At one week patients were transitioned to running shoes and started on physical therapy.

**Results:** Fifty nine patients met the study inclusion criteria (28 unilateral, 31 bilateral), with a mean age of  $60.4 \pm 5.7$  yrs and mean follow up time of  $22.8 \pm 12.4$  months. There were no significant differences found for change in 1<sup>st</sup>/2<sup>nd</sup> intermetatarsal angle, change in hallux valgus angle or in the overall complication rate between groups (all  $p > 0.05$ ). However, the unilateral group tended to do better than the bilateral group on most FAOS subscales postoperatively and these differences achieved statistical significance in the pain ( $94.7 \pm 9.1$  vs.  $85.5 \pm 14.2$ ,  $p = 0.005$ ) and ADL ( $96.9 \pm 5.1$  vs.  $92.3 \pm 10.7$ ,  $p = 0.041$ ) subscales at final follow up.

**Conclusions:** We found that simultaneous bilateral hallux valgus surgery and unilateral hallux valgus surgery yield comparable radiographic results, and similar low complication rates in older adults; however, pain relief may be higher if the procedure is staged in this population.

**Level of clinical evidence:** Therapeutic level 3

## **Lapidus Arthrodesis Technique: Low Non-union Rate and Early Weight-Bearing**

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Tyson E. Green, DPM, FACFAS

Lawrence A. Lavery, DPM, MPH

Kalieb Pourciau, DPM, FACFAS

### **Abstract:**

Aim: to describe the results of a retrospective cohort of 200 consecutive patients with Lapidus arthrodesis.

The Lapidus arthrodesis is an effective procedure for correcting hallux valgus yet debate still exists on the most effective fixation constructs to reduce the incidence of nonunion during early weight bearing post-operative protocols. We conducted a retrospective examination of one surgeon's technique and fixation construct for the Lapidus arthrodesis in 200 patients. Patients were fully weight bearing at 4 weeks. There were 6 non-unions out of the 200 patients. Patients were followed up for 1 year.

Results show that a single locking plate and four locking screws alone with no compression screw was sufficient for complete union, reduced pain, good correction and return to preoperative activity level.

**Level of Evidence:** Level 3

## **Foot and Ankle Surgery in a High Risk Population**

### **A 5-year Review of Patient-reported Outcome Measures Published in *The Journal of Foot and Ankle Surgery***

Todd Hasenstein, DPM

Timothy Greene, DPM

Andrew J. Meyr, DPM, FACFAS

#### **Abstract:**

This investigation presents a review of all the patient-reported outcome measures utilized by authors and published in *The Journal of Foot and Ankle Surgery*® from 01-2011 to 12-2015.

There were 933 articles published over this time frame, 416 (44.59%) of which were classified as “Original Research” and included in this analysis. And of these 416, 123 (29.57%) included at least one patient-reported clinical outcome measure. A total of 34 unique patient-reported outcome scales were utilized over this period of time. The most frequently reported scales were the AOFAS scale (60.16%), visual analog scale (34.15%), Short Form-36 (10.57%), Foot Function Index (5.69%), Maryland Foot Score (4.89%), and Olerud and Molander scoring system (4.89%). Seventeen articles (13.83%) utilized some form of original/subjective measure of patient satisfaction and/or expectation.

The results of this investigation detail the considerable variety of outcome measurement tools utilized by authors in *The Journal of Foot and Ankle Surgery*®, and might support the need for a shift toward the consistent use of a smaller number of valid, reliable, and clinically useful patient-reported scales within the foot and ankle surgical literature.

**Level of Evidence:** 4

## **The 3-Year Morbidity and Mortality after Transmetatarsal Amputation**

Barbara E. Adams, DPM

Josh Edlinger, DPM

Jason D. Pollard, DPM, FACFAS

### **Abstract:**

The purpose of this study is to evaluate the 3-year mortality following a non-traumatic transmetatarsal amputation.

We hypothesize that the 3-year mortality following a TMA will be less than that of a more proximal limb amputation. We also evaluated co-morbidities to determine their influence on long term complications. Electronic medical records were retrospectively reviewed for patients who underwent a transmetatarsal amputation at a Kaiser Northern California facility between March 2007 and January 2012. Only patients who had a minimum 3 years of postoperative follow-up or who died within 3 years were included in the study.

There were a total of 375 patients who underwent a transmetatarsal amputation between 2007 and 2011. A total of 136 patients died within 3 years after a TMA thus the 3-year mortality was 36.3%.

Non-palpable pedal pulses, end stage renal disease, coronary artery disease and a pre-operative albumin less than 3.5 were risk factors for 3-year mortality. Therefore, we believe these factors should be considered when counseling patients on the potential risks and benefits of a transmetatarsal amputation.

**Level of Evidence: 3**

## **Structures at Risk with Plantar Approach Retrograde First Metatarsal Charcot Beam Screw Insertion: A Cadaveric Study**

David R Larson, II, DPM, AACFAS

Jeffrey S. Weber, DPM, AACFAS

Christopher W. Reb, DO

Christopher F. Hyer, DPM, MS, FACFAS

Patrick E. Bull, DO

### **Abstract:**

The plantar approach for medial column retrograde intramedullary fixation (MCRIF) for Charcot midfoot deformity allows for easy access to the ideal starting point on the metatarsal head and is supported by good clinical outcomes data. The primary argument against its use is iatrogenic damage to the plantar structures of the metatarsophalangeal joint (MTPJ), which could cause tendon imbalances and resultant hallux deformity. Such complications have rarely been reported in the clinical outcomes literature, and the relative frequencies and types of plantar injuries remain unclear.

The purpose of this cadaveric study is to describe 1st MTPJ structure damage as a result of MCRIF. A standardized approach with a centrally located 6.5mm cannulated screw system was used for the study. The specimens were then dissected to evaluate damage to the plantar structures of the 1st MTPJ. Damage to named structures was categorized as: none, <50%, >50%, or completely transected. No structures were completely transected, and high grade damage (>50%) occurred in two flexor hallucis longus (FHL) tendons. Low grade damage (<50%) was frequently observed in the FHL, medial sesamoid, and plantar plate.

The plantar structures of the first MTPJ are a tightly constrained system which must be violated for a plantar approach MCRIF. The relative distribution of low grade damage to plantar structures may partially explain the low rate of hallux complications associated with this approach. Based on the current findings, careful dissection around the guide wire with retraction of the FHL tendon is advisable to avoid high grade damage.

**Level of Clinical Evidence: 4**

## **Prognostic Scoring System for Patients Undergoing Reconstructive Foot and Ankle Surgery for Charcot Neuroarthropathy: Charcot Reconstruction Preoperative Prognostic Score (CRPPS)**

Alissa R. Toth, DPM

David D. Rettedal, DPM

Adam J. Popchak, PT, PhD, SCS

Patrick R. Burns, DPM

### **Abstract:**

Charcot neuroarthropathy (CN) is a destructive process which occurs in patients with peripheral neuropathy, often due to poorly controlled diabetes mellitus. Surgical reconstruction may be necessary to provide a plantigrade foot that is wound free.

We retrospectively reviewed patients who underwent reconstructive surgery for CN. 34 patients (36 reconstructions) were included. Average patient age was 56.44 years. Average follow up was 56 months. We collected patient age, body mass index, presence of wound or osteomyelitis, anatomical location, activity of disease, and hemoglobin A1C. Using this data, each patient was given a score utilizing our novel prognostic scoring system, the Charcot Reconstruction Preoperative Prognostic Score (CRPPS).

Our primary outcome measure was no wound/no major amputation at final follow up. The limb salvage rate was 89% (32 of 36) and 78% (28 of 36) had no wound at final follow up. For patients with a favorable outcome, the average CRPPS was 2.96, and the average CRPPS in those with a wound or major amputation at final follow up was 4.33 ( $p=0.0024$ ). Logistic regression revealed two statistically significant predictors of wound and/or amputation: anatomical location (OR 5.0, CI 1.051 to 23.789,  $p=0.043$ ) and CRPPS (OR 2.724, CI 1.274 to 5.823,  $p=0.01$ ). CRPPS  $\geq 4$  was also predictive of a negative outcome (OR 7.286, CI 1.508 to 35.211,  $p=0.013$ ).

This scoring system, with a sensitivity of 75%, specificity of 71%, and a negative predictive value of 85%, is a potential starting point when educating patients and making treatment decisions in this exceptionally challenging group.

**Level of Clinical Evidence: 3**

## 5-Year Outcomes of Melanoma of the Foot Based on Depth of the Lesion

Barbara E. Adams, DPM

Mitzi L. Williams, DPM, FACFAS

Peter Peng, MD

The purpose of this study is to evaluate clinical outcomes of melanoma of the foot based on depth of the lesion. For a given depth, what is the 5-year incidence of local recurrence, positive sentinel lymph node biopsy, distant metastatic disease, and mortality?

We conducted a retrospective observational cohort study from 2007-2009. All patients 18 years and over with primary melanoma of the foot were included. A total of 76 patients were identified with 5-year follow-up. We performed bivariate analyses using chi-square or Fisher's exact tests to compare baseline demographic and clinical characteristics across categories of Breslow depth (<1mm, 1.01-2mm, 2.01-4mm or >4 mm). For the outcome measures (local recurrence, positive sentinel lymph node biopsy, distant metastatic disease, and 5-year survival), we calculated incidence rates and 95% confidence limits. Rates were stratified by Breslow depth to plot Kaplan Meier survival curves.

There were 18 deaths within 5 years. The overall death rates were 3%, 10%, 41%, and 64% for patients with melanoma in situ, lesions 1.01-2mm, 2.01-4mm, and >4mm, respectively (both Fisher's exact and log-rank tests p-value <0.001). Twenty-two patients had positive sentinel lymph node biopsy, 50% of whom died within 5 years. The rates of distant metastatic disease were 30%, 71%, and 79% for patients with lesions 1.01-2mm, 2.01-4mm, and >4mm, respectively (Fisher's exact test p-value=0.04). The rate of metastatic disease and 5-year mortality increases significantly for lesions >2mm in depth.

Given that systemic treatment options are limited, lesions <2mm should be treated aggressively to prevent metastatic disease.

**Level of Evidence: 3**

## **Long-Term Outcomes of Corrective Osteotomies Utilizing Porous Titanium Wedges for Flexible Flatfoot Deformity Correction**

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Emily A. Cook, DPM, MPH, FACFAS  
Jeremy J. Cook, DPM, MPH, FACFAS  
Lindsay J. Johnson, DPM, FACFAS  
Timothy A. Karthas, DPM  
Daniel Hansen DPM  
Byron N. Collier, DPM  
Philip Basile, DPM, FACFAS

### **Abstract:**

Common corrective osteotomies used in flexible flatfoot deformity reconstruction include the Cotton and Evans osteotomies, which both require structural graft to maintain correction. Auto-, allo- and xenografts are associated with a number of limitations including disease transmission risk, rejection risk, donor site morbidity, technical challenges related to creating graft sizes and susceptibility to graft resorption. Porous titanium is a synthetic substance designed to address these flaws but few studies are published on efficacy, safety and long-term outcomes.

A multicenter retrospective cohort of 63 consecutive preconfigured porous titanium wedges were evaluated in flexible flatfoot reconstruction between 6/1/2009 – 6/30/2015. The primary outcome was pre-post deformity correction efficacy. Secondary outcomes included maintenance of correction at minimum 12-month follow-up, complications, graft incorporation, and graft safety profile.

Multivariate linear regression found a statistically significant improvement in all radiographic parameters between preoperative measurements and final weight-bearing radiographs (calcaneocuboid,  $18.85^{\circ}$ ,  $SE=4.02^{\circ}$ ,  $P<0.0001$ ; Kite's,  $7.81^{\circ}$ ,  $SE=3.66^{\circ}$ ,  $P=0.04$ ; Meary's  $13.91^{\circ}$ ,  $SE=3.10^{\circ}$ ,  $P=0.0001$ ; calcaneal inclination,  $5.55^{\circ}$ ,  $SE=2.14^{\circ}$ ,  $P=0.015$ ). When restricted to patients with >4 years of follow-up, maintenance of correction appears robust in all four measurements, demonstrating a lack of bone or graft resorption. No patients were lost to follow-up, no major complications, no implant explantation or migration and all implants incorporated. Minor complications included hardware pain from plates over grafts (8%), one instance of scar neuritis, and a 5% incidence of transfer pain associated with the porous titanium wedges.

These results support the use of porous titanium wedges in both safety, degree and maintenance of correction in flatfoot reconstruction.

**Level of Clinical Evidence: IV**

## **Charcot Neuroarthropathy: A New Classification Model with Prognostic Measures**

Travis M. Langan, DPM  
Bethany J. Staehnke, DPM  
Nicholas J. Lowery, DPM  
Dane K. Wukich, MD

### **Abstract:**

Introduction: Charcot neuroarthropathy (CN) is an increasing problem among the diabetic population. CN is a diagnosis that every foot and ankle specialist will encounter in practice. The diagnosis of CN is largely based on patient history, as well as clinical and radiographic examination. Previous classification schemes have been described, however do not provide prognosis or treatment recommendations. This study aims to provide a classification that can be used to predict prognosis and guide treatments for CN.

Methods: A retrospective review was conducted to gather data about CN patients treated by a single surgeon. 318 CN feet met inclusion criteria and were classified by anatomic location, chronicity of the disease, and the presence of a wound and/or infection all at time of initial presentation. Statistical analysis followed.

Results: 318 feet were classified into the proposed “ARM” classification with a 49.2 month average follow up. Surgical intervention was required in 234 of 318 CN limbs in this study (73.6%). 35 CN limbs underwent trans-tibial amputation (11%). Of the 277 functional limbs, 121 required bracing for ambulation at final follow up.

Conclusions: Midfoot and ankle CN are the most common anatomic locations. Patients with Charcot who present with a wound and infection, regardless of anatomic location or chronicity, are at a 4x risk of major amputation. The proposed classification provides prognostic indications for CN at the time of initial presentation

**Level of Evidence: 3**

## **Intraoperative Nerve Monitoring for Tarsal Tunnel Decompression: A Surgical Technique to Improve Outcomes**

Gregory P. Still, DPM, FACFAS  
Zeno J. Pfau, DPM

### **Abstract:**

The aim of the current study was to evaluate the effectiveness of Intraoperative Neuro Monitoring (INM) as an adjunct in performing tarsal tunnel decompression surgery. The study retrospectively reviewed 38 patients who met inclusion criteria.

In the evaluation, INM was used to measure the voltage of the abductor hallucis and digiti quinti muscles both pre and post-decompression. Patient outcomes were ascertained from clinical findings and classified as Excellent, Fair, or Poor. Patient outcomes and the voltage change were measured and assessed for association, and statistically significant differences were found between outcome groups.

Seventy-six percent of patients had excellent outcomes with a mean percent change in voltage of 567% and 615% for abductor hallucis and abductor digiti quinti, respectively. The study supports INM as a useful adjunct in performing tarsal tunnel decompression.

**Level of Evidence:** 3. Retrospective Comparative Study

## **Recalcitrant Heel Pain of Neurogenic Origin: Clinical Presentation and Neurophysiologic Diagnosis in 108 Patients**

Erin E. Klein, DPM, MS, FACFAS

Lowell Weil, Jr., DPM, FACFAS

Adam E. Fleischer, DPM, MPH, FACFAS

### **Abstract:**

Plantar fasciitis is a common problem that accounts 11 – 15% of office visits to the foot and ankle specialist each year. Tarsal tunnel syndrome is normally suspected after the first three tiers of treatment fail for plantar fasciitis to alleviate symptoms. The primary purpose of this paper is to examine the initial presentation of these patients to identify any commonalities in patient demographics, history or clinical exam. The secondary purpose of this paper is to review EMG/NCV data to identify if there is any correlation between tarsal tunnel and the presence or absence of lumbosacral pathology.

Records were reviewed to identify consecutive patients who presented to the Institute and were seen by a single surgeon and a single neurologist. Initial clinical presentation and neurological studies were reviewed and analyzed

108 patients (30 men, 78 women) were included in the analysis. Included patients had an average age of  $52.9 \pm 12.1$  (range: 19 - 79) and had an average BMI of  $28.6 \pm 5.3$  (range: 20.0 - 44.6). 74.0% of patients had a history of post static dyskinesia. 87.1% of patients had history of pain that was worse while standing or walking. A positive tinell's sign was found to have a sensitivity of 80% and 97.7% specific. 106/108 patients had an NCV/EMG study positive for a tarsal tunnel on the symptomatic side. 88/108 or 81.5% had an NCV/EMG study that was consistent with a lumbosacral radiculopathy.

This is a new finding and may raise more questions than it answers at this point in time, however, this should alert the astute physicians as to the possibility of a proximal neurologic pathology occurring concurrently with the symptoms in the foot and ankle.