

# 8 Rearfoot Pain and Surgery

DANIELLE BUTTO, DPM AND LAWRENCE A. DiDOMENICO, DPM

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## Frequency and Impact of Adverse Events in Patients Undergoing Surgery for End-Stage Ankle Arthritis

Norvell DC, Shofer JB, Hansen ST, Davitt J, Anderson JG, Bohay D, Coetzee JC, Maskill J, Brage M, Houghton M, Ledoux WR, Sangeorzan BJ. *Foot Ankle Int.* 2018 Sep;39(9):1028-1038.

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*Objective*—End-stage ankle arthritis (ESAA) is debilitating, and leads patients to seek surgical treatment (either ankle arthrodesis or ankle arthroplasty). This study sought to assess the complication risk of adverse events (AEs) or relative effectiveness of these procedures by summarizing the total number of AEs, evaluating AE risk in comparing these two procedures, and evaluating ankle and non-ankle AEs on patient-reported functional outcomes.

*Methods*—This multi-site prospective cohort study used six sites to compare ankle arthroplasty to ankle arthrodesis in ESAA treatment. Inclusion and exclusion criteria were set, baseline characteristics were collected, and 517 patients with ESAA received one of the two surgical procedures. Follow-up scores were available for 494 of these patients. The Foot and Ankle Ability Measure (FAAM) assessed the outcomes at a 12-month follow-up. A Chi-square test was used to assess the differences in categorical variables between the treatment groups while a two-sample *t*-test was used to assess continuous variable differences. A multinomial logistic regression was used to compare risk and impact of ankle and non-ankle AEs against no reported AEs. Odds ratios and 95% confidence intervals in bivariable models and multivariable models were utilized for ankle AE against none and non-ankle AE. Differences in postoperative improvement were assessed through linear mixed effects regression by the frequency of an AE.

*Results*—This study found that a total of 628 AEs were reported (477 arthroplasty and 151 arthrodesis), with 50 ankle-specific AEs (33 arthroplasty and 17 arthrodesis). An increased risk was identified for an ankle-specific AE in an arthrodesis procedure as opposed to arthroplasty procedure. No increased risk was found in non-ankle AEs when comparing the two groups. The patients experi-

encing ankle-specific AEs were found to have significantly less improvement in FAAM when compared to those with no AEs or non-ankle AEs. The study found no evidence that the effect of AE status was modified by surgical procedure.

*Conclusion*—This study showed that while patients see an improvement in all functional outcomes (except mental health), ankle-specific AE occurrence negatively impacts patient improvement. Ankle-specific AEs were uncommon occurrences and were weakly associated with the surgical procedure. Non-ankle AEs were found to be less impactful, and it does not seem prudent to track the occurrence.—*M.A. Peter*

◆ Ankle arthritis affects around 6% of the population. The condition can be debilitating with symptoms such as pain, dysfunction and reduced quality of life. This study aimed to review adverse events for patients undergoing ankle procedures for end-stage arthritis. The authors compared ankle arthroplasty with arthrodesis, and the results identified 50 ankle-specific complications (8% in the arthroplasty group and 17% in the arthrodesis group). Compared to the other adverse events reported, the ankle-specific events were infrequent and only weakly associated with outcome. As ankle arthroplasty continues to evolve, the surgeon must continually be re-educated. Adverse events can happen with any surgery, and the patient's co-morbidities and other factors should determine whether they receive arthroplasty or arthrodesis.—*D. Butto, DPM and L.A. DiDomenico, DPM*

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### **Heel Pain in Psoriatic Arthropathy: Analysis of a Series of 291 Patients**

Morales Ivorra I, Juárez López P, López de Recalde M, Carvalho PD, Rodríguez Moreno J.  
Reumatol Clin. 2018 Sep-Oct;14(5):290-293.

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*Objective*—This study sought to determine the prevalence of heel pain in patients with psoriatic arthritis, by analyzing the association between heel pain and other demographic or body composition variables of the disease.

*Methods*—This cross-sectional, observational retrospective study was conducted in a teaching hospital in Barcelona, Spain. From a population of 347 patients diagnosed with psoriatic arthritis, there were 291 patients also experienced heel pain and were assessed by the same rheumatologist every six to 12 months. Demographic data included age, sex, and body mass index. Body composition variables were assessed for all patients according to the Classification for Psoriatic Arthritis (CASPAR). Data analysis was done using Chi-square test, analysis of variance (ANOVA) for univariate analysis and multivariate binary logic regression model.

*Results*—Data from univariate analysis revealed a statistically significant association ( $p < 0.05$ ) between heel pain and younger age, early onset of skin and joint

disease, a history of dactylitis and a first-degree family member with psoriatic arthritis. Multi-variate analysis of data showed statistical significance ( $p < 0.05$ ) in association between history of dactylitis and younger age.

*Conclusion*—In psoriatic arthritis, heel pain is a specific clinical manifestation of Achilles enthesitis and enthesopathy. This study showed statistical and clinical significance in the association between heel pain and dactylitis, with first-degree family members having a history of psoriatic arthritis and an early onset of psoriatic arthritis and psoriasis. The study supported the thesis that enthesitis and dactylitis may have a connection in their pathophysiology.—*C. Mkoji*

◆ Psoriatic arthritis is a chronic inflammatory disease, and enthesitis involvement is a typical manifestation. This study examined the prevalence of heel pain as a substituted variable of enthesitis in patients with psoriatic arthritis. They found a cumulative prevalence of heel pain in 35% of their patients. It is important to remember that spondyloarthritis commonly present with symptoms in the feet, first. If a patient presents with enthesitis or heel pain not responsive to normal intervention, it may warrant a rheumatologic work-up.—*D. Butto, DPM and L.A. DiDomenico, DPM*

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### **Comparison of Effects of Low-Level Laser Therapy and Extracorporeal Shock Wave Therapy in Plantar Fasciitis Treatment: A Randomized, Prospective, Single-Blind Clinical Study**

Yinilmez Sanmak ÖD, Geler Külcü D, Mesci N, Altunok EÇ.  
Turk J Phys Med Rehabil. 2018 Oct 27;65(2):184-190.

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*Objective*—Many studies have assessed the effectiveness of plantar fasciitis treatment modalities. However, there is limited literature on the effectiveness of extracorporeal shock wave therapy (ESWT) in comparison to other treatments. This study compared the outcomes of ESWT and low-level laser therapy (LLLT) with respect to heel pain, fascia thickness and foot functionality.

*Methods*—This prospective, single-blind clinical study began with 40 patients from the Physical Medicine and Rehabilitation outpatient clinic in Turkey, with 34 attending the follow-up visit. The 40 patients were randomized into two equal groups. Group 1 received ESWT once per week for three weeks, applied in a circular motion at the insertion site for 1,000 shocks and along the fascia for another 1,000 shocks. Group 2 received LLLT three times per week for four weeks, applied in a circular motion at the insertion site for one minute and along the fascia for another minute. The outcomes were measured using ultrasonography (USG), visual analog scale (VAS) and foot function index (FFI). USG imaging evaluated the thickness of the plantar fascia in the sagittal plane at its insertion site. The VAS-pain score was provided by the patients to indicate their pain severity. The

FFI questionnaire measured the impact of plantar fasciitis on the patients' pain, disability, and activity restriction throughout the course of treatment. The data was collected at baseline, immediately following the treatment and after one month, and was expressed in terms of mean, standard deviation, median, minimum, and maximum. The Friedman's test and the Wilcoxon test with the Bonferroni correction were used to identify significant changes over time for each of the groups.

*Results*—The plantar fascia thickness, VAS, and FFI scores of both the ESWT and LLLT groups were all found to be significantly decreased from baseline to one month after treatment. A post-hoc analysis comparing changes over time within the measured outcomes found no significance between the two groups.

*Conclusion*—This study found that both treatment modalities were effective with respect to controlling pain, reducing plantar fascia thickness, and improving the overall functional status of the patient. The authors suggest that ESWT and LLLT should be used in clinical practice as a non-invasive, cost-effective and easy-to-use treatment modality for plantar fasciitis.—*V.J. Putz*

◆ Idiopathic plantar fasciitis (PF) is the most common cause of heel pain, and mechanical overload is a major factor in its development. Typically, conservative measures such as stretching, rest, ice therapy, NSAIDs, inserts and injections are utilized. When these measures fail, more advanced or invasive measures are used. This study compared extracorporeal shockwave therapy and low-level laser therapy in the treatment of PF in regard to pain, function and thickness. It was found that both therapies showed a significant improvement in VAS and function scores. Additionally, an improvement in thickness of the PF was observed. There was no significant difference between the two groups. The *n* number was low in this study. Nonetheless, when conservative treatment fails the provider may consider these two interventions, if appropriate, before surgical intervention.—*D. Butto, DPM and L.A. DiDomenico, DPM*

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### **Electrical Dry Needling as an Adjunct to Exercise, Manual Therapy and Ultrasound for Plantar Fasciitis: A Multi-Center Randomized Clinical Trial**

Dunning J, Butts R, Henry N, Mourad F, Brannon A, Rodriguez H, Young I, Arias-Burúa JL, Fernández-de-Las-Peñas C.

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*Objective*—The best treatment modalities for plantar fasciitis remains controversial. Because no single option has provided a high quantity of evidence, combining many options may facilitate a more effective regimen. This study investigated increasing the success rate of plantar fasciitis treatment by combining dry needling with exercise, manual therapy and ultrasound.

*Methods*—This multi-center study included 111 participants with plantar fasciitis from ten outpatient physical therapy clinics across six different states. The trial compared two treatment protocols. One group was managed with manual therapy, exercise, and ultrasound while a second group was managed with electrical dry needling, manual therapy, exercise and ultrasound. All participants received up to eight treatment sessions at a frequency of once or twice per week over four weeks. The primary outcome measurement was first-step pain during the morning as measured by the Numeric Pain Rating Scale (NPRS). Secondary outcomes were also measured and included: resting mean foot pain, pain during activity, the Lower Extremity Functional Scale (LEFS), the Foot Functional Index (FFI), medication intake, and the Global Rating of Change (GROC). The data was collected at baseline, one week, four weeks, and three months following the initial treatment session. The effects of treatment were examined with two-by-four mixed model analyses of covariance (ANCOVA) comparing the treatment groups with time and adjusting the baseline data for evaluating between-group differences.

*Results*—The mixed-model ANCOVA revealed that patients receiving electrical dry needling experienced significantly greater improvements in first-step morning pain at four weeks and three months than those receiving only manual therapy, exercise and ultrasound. Electrical dry needling also significantly improved resting foot pain, pain during activity, LEFS, FFI Pain Subscale, FFI Disability Subscale, and FFI Total Score, but not FFI Activity Limitation Subscale. In addition, significantly more patients in the electrical dry needling group completely stopped taking medication for their pain compared to the other group.

*Conclusion*—This multi-centered study demonstrated that patients with plantar fasciitis experienced greater improvements with first-step morning pain intensity, resting heel pain, pain during activity, function, related-disability and foot health-related quality of life, and less medication intake when managed with electrical dry needling, manual therapy, exercise and ultrasound. Further studies need to be done to improve the effectiveness of the dry needling equipment and technique.  
—V.J. Putz

◆ When plantar fasciitis cases become chronic, they can be difficult to treat with the typical measures. This study reviewed patients undergoing a protocol of manual therapy, exercise and ultrasound, both with and without electrical dry needling. They then evaluated their first-step morning pain, resting foot pain, and pain during activity. They compared the patients who received dry needling to those who did not. It was found that the patients who received dry needling had significantly greater improvements in the measures than those who did not. When plantar fasciitis becomes stagnant to regular intervention, the provider may want to consider adding in dry needling.—D. Butto, DPM and L.A. DiDomenico, DPM

**Medial Cuneiform Opening Wedge Osteotomy for Correction of Flexible Flatfoot Deformity: Trabecular Titanium versus Bone Allograft Wedges**

Romeo G, Bianchi A, Cerbone V, Parrini MM, Malerba F, Martinelli N.  
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*Objective*—Adult flatfoot is a common multiplanar pathology that can involve the hindfoot, midfoot and forefoot. In adult flatfoot, the loss of the longitudinal arch can result from multiplanar deformities which can cause functional overload of muscle-tendon complexes, joint subluxation, instability and significant daily pain. Many different surgical interventions have been indicated for the correction of adult flatfoot, however adequate correction of the forefoot varus component of adult flatfoot may be adequately achieved via Cotton osteotomy. The recent literature suggests utilization of Cotton osteotomy for the attenuation of the forefoot varus component of adult flatfoot. The Cotton osteotomy can address the residual forefoot varus component via plantarflexing opening wedge osteotomy of the medial cuneiform with a wedge-shaped bone graft inside the medial cuneiform. The purpose of this study was to compare and evaluate the clinical and radiographic outcomes of utilizing allograft versus titanium wedges in the Cotton osteotomy technique.

*Methods*—In this adult retrospective study, patients were included based on the following conditions: intractable hindfoot pain despite previous conservative treatment with symptoms for more than 12 months, collapsed longitudinal arch, hindfoot valgus, and forefoot varus confirmed by radiograph, and flexible flatfoot deformity. Patients were randomly divided into either the bone allograft group ( $n = 18$ ) or the metallic implant group with BIOFOAM<sup>®</sup> Cotton Wedge ( $n = 18$ ) for the correction of their forefoot varus. The American Orthopaedic Foot and Ankle Society score, Foot Function Index, and visual analog scales for pain were collected pre-operation for a baseline and at the last follow-up. Radiographic assessment of the Kite's and Meary's angles were measured before and after surgery.

*Results*—The mean follow-up time for the metallic implant group was  $21.7 \pm 2.9$  months (range of 18 to 25 months). Pre-operation AOFAS, FFI-Pain, and FFI-Disability scores were significantly different between both cohorts ( $p < 0.05$ ). Postoperative FFI-Pain and analogue scores were significantly different between both cohorts ( $p < 0.05$ ). Ninety-two percent of patients reported being satisfied with pain and overall function after surgery. Pre and postoperative clinical scores and radiograph angles were significantly different for both the allograft group ( $p < 0.05$ ) and the metallic implant group ( $p < 0.05$ ). The metallic implant group had a smaller Meary's Angle postoperation compared to the allograft group ( $1.4 \pm 1.9$  versus  $1.8 \pm 1.7$ ,  $p = 0.05$ ).

*Conclusion*—Cotton osteotomy with metallic implant can provide comparable and optimal outcomes compared to bone allograft. Future research with longer

follow-up times and more follow-up studies are warranted in order to confirm osseointegration long-term efficacy of trabecular titanium wedges.—*Y. Radzi*

◆ The flatfoot deformity is a multi-planar deformity that requires addressing the hindfoot, midfoot and forefoot. Hindfoot procedures alone may result in a forefoot supinatus. One procedure to address the forefoot supinatus and stabilization of the medial column is the Cotton osteotomy, which uses bone allograft and titanium wedges. This study compared allograft with the titanium wedge. They only had 18 patients in each group, but found similar outcomes between the two groups. The authors recommended the use of titanium wedges for their advantages, but the surgeon must be cognizant of the cost of these implants.—*D. Butto, DPM and L.A. DiDomenico, DPM*

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#### **A Comparative Study of Three Commonly Used Fixation Techniques for Isolated Medial Malleolus Fracture**

Kochai A, Türker M, Çiçekli Ö, Özdemir U, Bayam L, Erkorkmaz Ü, Şükür E.

*Eklemler Hastalıkları Cerrahisi*. 2018 Aug;29(2):104-109.

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*Objective*—Ankle fractures are the most common fractures treated by orthopaedic surgeons, with open reduction and internal fixation (ORIF) being the standard of care. The same holds true for medial malleolus fractures, as a failure to reduce these may result in post-traumatic osteoarthritis. This study sought to compare three different types of fixation techniques used for medial malleolus fractures: tension-band wire fixation, partially-threaded cannulated screws, and fully-threaded cannulated headless compression screws.

*Methods*—This retrospective study assessed 90 patients who had medial malleolar fractures at a university hospital in Sakarya, Turkey. Participants included in the study were divided into three groups: tension-band wire fixation (Group A), partially-threaded cannulated screws (Group B), and fully-threaded cannulated headless compression screws (Group C). The type of medial malleolus fracture, healing rates, implant-related complications, rate of infection, rate of hardware removal, weightbearing restrictions, mean interval time from the injury to surgery, and BMIs were also investigated. Standard anteroposterior (AP), lateral and mortise ankle radiographic views were evaluated to identify fracture patterns. The American Orthopaedic Foot and Ankle Society (AOFAS) scoring system was used for clinical evaluation.

*Results*—Statistical analysis indicated that there was no significant difference amongst the three groups with regard to age, gender, BMI, follow-up period, and fracture type. The time to union for Group C was significantly shorter than both

Groups A and B. Implant failure or irritation was noted in both Groups A and B, but not in Group C. This finding was statistically significant across the three groups ( $p = 0.037$ ), but not between Groups A and B ( $p = 0.41$ ). There was no significant difference amongst the three groups with regard to AOFAS scores. All surgical outcomes were deemed good or excellent. Implant-related complications were noted in patients with a low BMI in both Groups A and B, but not in Group C. This finding was statistically significant, demonstrating a positive correlation between low BMI and implant-related complication ( $p < 0.0001$ ).

*Conclusion*—This retrospective study showed that the treatment of medial malleolar fractures with ORIF produces good and excellent surgical outcomes with regard to AOFAS scores. Patients treated with fully-threaded cannulated headless compression screws exhibited significantly shorter times to union. Patients with a low BMI treated with tension-band wire fixation or partially-threaded cannulated screws experienced implant-related complications. So, the authors of this study suggest using fully-threaded cannulated headless compression screws in patients with a low BMI.—*T.N. Saucier*

◆ The aim of this study was to compare tension-band wiring, partially-threaded screws and fully-threaded headless screws in the fixation of isolated medial malleolus fractures. They found that headless, fully-threaded screws provided a shorter time to union by one week and less irritation than the other two groups. All groups went onto fusion with no malunion or non-union noted. All three techniques are viable options. The surgeon should employ the technique that best fits the fracture pattern.—*D. Butto, DPM and L.A. DiDomenico, DPM*

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#### **Mid- to Long-Term Outcomes after Weber B-Type Ankle Fractures with and without Syndesmotic Rupture**

Kohake MBJ, Wiebking U, O'Loughlin PF, Krettek C, Gaulke R.  
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*Objective*—Weber B-type ankle fractures are the most common type of ankle fractures, with syndesmotic disruption simultaneously occurring. These injuries are typically treated with open reduction and internal fixation (ORIF) and syndesmotic screw fixation. Failure to treat these may result in instability and post-traumatic osteoarthritis of the ankle. This study sought to assess the impact of syndesmotic screw fixation on overall clinical and radiological outcomes following Weber B-type ankle fractures.



*Methods*—This retrospective study assessed 61 patients who had isolated, closed Weber B-type ankle fractures at a university in Hannover, Germany. Participants included in the study were divided into two groups: syndesmotic injury with screw fixation or intact syndesmosis without screw fixation. The anatomy of the fracture and ankle ligament injury was investigated. The Olerud-Molander-Ankle-Score (OMAS) and American Orthopaedic Foot and Ankle Society (AO-FAS) scoring system were used for clinical evaluation. The Short Form Health Survey (SF)-36 was used to evaluate limitations in health-related quality of life. The Kellgren-Lawrence Score (KLS) was used to evaluate postoperative osteoarthritis on weightbearing lateral and mortise ankle radiographic views.

*Results*—Statistical analysis using an independent *t*-test indicated that there was no significant difference between the two groups with regard to age, gender, BMI, follow-up period, pain level, clinical outcome scores, and radiographic evidence of osteoarthritis. An additional fracture of the posterior malleolus was noted in patients with a syndesmotic injury, but not in patients with an intact syndesmosis. This finding was statistically significant ( $p < 0.001$ ). There was no significant difference between the two groups with regard to additional ankle ligament injury. Restriction in dorsiflexion of the ankle joint was noted in patients with a syndesmotic injury ( $15^\circ$ ), but not in patients with an intact syndesmosis ( $20^\circ$ ). This finding was statistically significant ( $p = 0.028$ ).

*Conclusion*—This retrospective study showed that the treatment of Weber B-type ankle fractures with syndesmotic disruption by means of ORIF and syndesmotic screw fixation does not affect overall clinical and radiological outcomes. Syndesmotic screw fixation did not affect patients' subjective and objective outcomes, nor did it affect patients' quality of life at mid- and long-term follow-up. Patients treated with syndesmotic screw fixation exhibited significant restriction in ankle dorsiflexion values. So, the authors of this study believe that disruption of the distal tibiofibular syndesmosis can be treated with screw fixation because it doesn't negatively impact patient outcomes, despite a mild limitation in ankle joint dorsiflexion.—*T.N. Saucier*

◆ Weber B ankle fractures are common. When displaced, they often undergo ORIF. Some Weber B ankle fractures also have an associated syndesmosis disruption. This study retrospectively compared Weber B ankle fractures with and without syndesmosis disruption. It was found that both groups had similar outcome scores and pain levels. The likelihood of post-traumatic arthritis was not different between the two groups. It was found that patients with syndesmotic disruption had significant restriction in dorsiflexion compared to those with an intact syndesmosis. This finding is important to tell patients prior to surgery in regard to their expected outcomes.—*D. Butto, DPM and L.A. DiDomenico, DPM*

*QUESTIONS*

- 8-1. In the study by Norvell et al., how many ankle-specific complications were identified when comparing arthroplasty with arthrodesis?
- A. 15
  - B. 20
  - C. 50
  - D. 35
- 8-2. In the study by Kochai et al., in addition to less irritation, headless, fully-threaded screws provided a shorter time to union by \_\_\_\_\_ compared to tension-band wiring and partially-threaded screws.
- A. one week
  - B. three days
  - C. two weeks
  - D. one month