

# An Update on the Literature for Foot And Ankle Surgery 2016: Are We Practicing Evidence-Based Medicine?

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### INTRODUCTION

With the exponential rise in publications both online and in print, there is an increasing amount of information available to foot and ankle surgeons. This flood of data makes it difficult to stay current, and even more difficult to incorporate evidence-based medicine into our practices. A recent article, entitled “What to Read and How to Read It: A Guide for Orthopedic Surgeons”(1) does a great job at addressing this issue and is worth reviewing. This update article summarizes recent Level 1 scientific articles related to foot and ankle surgery, published between January 2016 and December 2016. The sources for these articles include *Journal of Foot and Ankle Surgery*; *Foot and Ankle International*, *Journal of Bone and Joint Surgery (Am)*, and relevant Cochrane Review articles. A total of 10 Level I studies were published during this time period.

### FOREFOOT

Intraoperative fluoroscopy is a great asset during surgery; however, one significant limitation is the inability of obtaining weight-bearing images. These images are crucial to procedures such as fusion of the first metatarsocuneiform joint. For this reason, Bofelli and Mahoney (2) were interested in simulating a weight-bearing lateral image that would directly correlate in the sagittal plane to the 10-week postoperative lateral weight-bearing radiograph for patients undergoing a Lapidus procedure. Fifty consecutive feet were enrolled in the study and the foot was positioned by the primary surgeon. The simulated weight-bearing lateral image was accomplished by the following procedure: the image intensifier was placed against the medial aspect of the foot. The surgeon’s palm held a plastic cutting board “foot plate” under the foot, positioned perpendicular to the image intensifier. The foot was loaded and the ankle dorsiflexed to 90 degrees. The leg was positioned and supported at the knee by the opposite hand. Correlation was assessed by comparing sagittal plane alignment of the first to second ray using the dorsal cortices as reference points. The results showed a 100% correlation between the simulated weight-bearing lateral image and the 10-week postoperative lateral weight-bearing radiograph. The clinical utility of this study is that the surgeon can predict the final and desired outcome of the Lapidus procedure in the sagittal plane.

Arthritis of the great toe joint can be a debilitating condition and many procedures have been developed over the years to address it; however, arthrodesis continues to remain the gold standard. In a prospective, randomized, multi-centered trial, the authors were interested in comparing the efficacy and safety of a small synthetic implant to arthrodesis (3). The synthetic cartilage bone implant studied was a hydrogel implant (Cartiva Synthetic Cartilage Implant). Patients with grade II, III, or IV hallux rigidus were randomized in a 2:1 fashion, leaving 147 implant and 47 arthrodesis patients. All analyses were statistically significant, demonstrating non-inferiority of the implant at 2 years follow-up for pain relief, functional improvement, and safety. Even though long-term outcome studies have not been performed, the authors suggest this is still a good alternative to an arthrodesis procedure because of the minimal bone resection required, and the maintained and/or improved first metatarsophalangeal joint motion. Minimal resection required with this implant, as compared to previous implants, allows for a more successful conversion to arthrodesis in the future if necessary.

The preferred method of anesthesia for hallux valgus surgery varies by center, hospital, and region. Karaarslan et al were interested in comparing ultrasonography-guided popliteal sciatic nerve block confirmed with nerve stimulation to spinal anesthesia for hallux valgus repair (4). Sixty American Society of Anesthesiologists category 1 or 2 patients were enrolled and followed. The spinal anesthesia group (n = 30) received 2.5 ml of 0.5% hyperbaric bupivacaine. The popliteal block group patients (n = 30) had 20 ml of 0.5% bupivacaine (containing 5µg/ml ephedrine) administered to block the tibial and common peroneal group; the saphenous nerve was blocked with 10 ml of 1% prilocaine. Adverse events such as hypotension, bradycardia, postural puncture headache, and urinary retention rates were noted with spinal anesthesia but not in the popliteal block group. Statistically lower visual analog scale scores, higher patient satisfaction and increased time to first analgesic requirement were noted in the popliteal block group. Pain scores were noted to be similar at the 24th hour for both groups. Popliteal nerve block may be a better option when compared to spinal anesthesia for hallux valgus surgery given lower complication rates and better immediate postoperative pain management.

## TRAUMA

Fractures of the proximal fifth metatarsal have a high incidence of delayed union or nonunion. Electromagnetic bone growth stimulation is known to enhance bone healing by upregulating numerous growth factors. Streit et al were interested in quantifying the effect, *in vivo*, of pulsed electromagnetic fields (PEMF) on growth factor expression and healing time of fifth metatarsal nonunions (5). Eight patients with a fifth metatarsal delayed or nonunion with no radiographic sign of healing for at least 3 months, were prospectively randomized into the active stimulation or placebo PEMF device group. Each patient underwent an open biopsy of the fracture site for messenger-ribonucleic acid (mRNA) and was fitted for the active or placebo device. The device utilized was Biomet EBI Bone Healing System (Zimmer Biomet Bone Healing Technologies). Three weeks after the initial open biopsy, patients underwent a repeat biopsy and an open reduction with internal fixation of the fracture. All fractures went on to heal; however, faster time to heal (8.9 weeks versus 14.7 weeks) was seen in the active PEMF group. A significant increase of placental growth factor, a key regulator of angiogenesis and vasculogenesis was also noted in the active PEMF group.

Surgical outcomes for acute Achilles ruptures are generally good to excellent, however, very few long-term studies exist comparing simple end-to-end repair with fascial flap-augmented repair in patients treated with the same postoperative rehabilitation protocol. In cadaveric studies, augmentation has been shown to increase gap resistance. In their prospective, randomized trial of 60 patients, Heikkinen et al followed their patients for a mean of 14 years (6). The aim was to compare long-term results of augmented (down-turned gastrocnemius flap) to nonaugmented repair of Achilles tendon ruptures and to evaluate if the strength deficit noted at 1 year follow-up resolved with time. This study was a follow-up to a 2009 study. They reported similar clinical results, tendon elongation, complications, and rerupture rates between the 2 groups. They also noted that the strength deficit present at 1 year postoperative was permanent. Interestingly, ruptures did not worsen long-term health-related quality of life in patients compared to a reference population, but the clinical relevance of decreased plantarflexion strength remains unknown.

## SPORTS MEDICINE

Soccer players have some of the highest rates of ankle injuries, and several ankle injury prevention programs have been developed. A meta-analysis of 10 randomized controlled trials consisting of 4,121 female and male soccer athletes were analyzed (7). The purpose of the study was to identify the highest level of evidence for injury prevention

programs, to evaluate the quality of these studies, and to evaluate the effectiveness of established injury prevention programs. Interventions consisted of neuromuscular, proprioceptive, strengthening, and stretching exercises. For soccer players, a significant protective effect against ankle injuries was observed due to injury prevention programs. The findings of this meta-analysis support the use of injury prevention programs for soccer players.

Lateral ankle instability, which is usually a sequelae of ankle sprains, also commonly affects athletes. If conservative management fails, it is often treated surgically with a modified Broström procedure. Yeo et al were interested in comparing the clinical and radiographic results of an all-inside arthroscopic approach to open modified Broström operation (8). Forty-eight patients were randomized into 1 of the 2 groups and followed for up to a year. Clinically, no statistically significant difference between the 2 groups was found at final follow-up in the Karlsson, AOFAS, or visual analog scale scores. Radiographically, no statistically significant difference was found at final follow-up for anterior talar translation or talar tilt.

## MISCELLANEOUS

Although the effectiveness of oral nonsteroidal anti-inflammatory drugs (NSAIDs) for acute injuries presenting to the emergency department has been established, the pain relief afforded by topical NSAIDs is insufficient. Serinken et al were interested in comparing the pain relief effect of topical ketoprofen to placebo in patients presenting with an ankle sprain at 15 minutes and 30 minutes post application (9). A total of 100 patients were prospectively randomized into 2 groups, one received 2.5% topical ketoprofen (gel form) and the other a placebo. Two grams of the topical agent was rubbed over the point of maximum tenderness, involving a 5 cm area. At 15 minutes and 30 minutes post application, pain reduction was better in the ketoprofen group. Given the increasing concern for opioid abuse, this may be a safer, but effective mode of pain control, particularly for acute ankle sprains presenting to the emergency department.

The foot continues to provide a unique challenge for intraoperative sterilization, and surgical site infection is frequently noted to be the most common complication following foot and ankle surgery. Hunter et al analyzed 95 patients who were prospectively randomized into 1 of 2 preoperative preparation groups (10). One group was prepped first with 70% isopropyl alcohol followed by 4% chlorhexidine solution, and the other group was prepped in the reverse order. Aerobic cultures were taken from the dorsal third webspace of the operative limb during 4 different points in the procedure. Although significantly fewer positive cultures were noted in the group that had the isopropyl alcohol application followed by the chlorhexidine

solution, no difference in clinical wound infection rate was observed.

Continuing with the theme of surgical site infection, SanGiovanni et al (11) were interested in observing the effect of intraoperative application of autologous platelet-rich plasma (PRP) on surgical site infection or delayed wound healing. They postulated that these endpoints would be reduced with application of PRP. Five-hundred patients were enrolled and randomized in this study, 250 receiving PRP/platelet poor plasma (PPP) and 250 patients serving as the control group. The patients were followed for an average of 60 days. The authors did not find any reduction in postoperative infection or delayed wound healing in the study group, however, they did find a high variability of growth factors between patients, suggesting inconsistent therapeutic treatment delivery from patient to patient.

## REFERENCES

1. Krueger CA, Hsu JR, Belmont PJ. What to read and how to read it: a guide for orthopaedic surgeons. *J Bone Joint Surg Am* 2016; 98:243-9.
2. Boffeli TJ, and Mahoney KJ. Intraoperative simulated weightbearing lateral foot imaging: the clinical utility and ability to predict sagittal plane position of the first ray in Lapidus fusion. *J Foot Ankle Surg* 2016;55:1158-63.
3. Braumhauer JF, Singh D, Glazebrook M, Blundell C, DeVries G, Le IL, et al. Prospective, randomized, multi-centered clinical trial assessing safety and efficacy of a synthetic cartilage implant versus first metatarsophalangeal arthrodesis in advanced hallux rigidus. *Foot Ankle Int* 2016;37:457-69.
4. Karaarslan S, Tekgül ZT, Simsek E, Turan M, Karaman Y, Kaya A, et al. Comparison between ultrasonography-guided popliteal sciatic nerve block and spinal anesthesia for hallux valgus repair. *Foot Ankle Int* 2016;37:85-9.
5. Streit A, Watson BC, Granata JD, Philbin TM, Lin HN, O'Connor JP, et al. Effect on clinical outcome and growth factor synthesis with adjunctive use of pulsed electromagnetic fields for fifth metatarsal nonunion fracture: a double-blind randomized study. *Foot Ankle Int* 2016;37:919-23.
6. Heikkinen J, Lantto I, Flinkkila T, Ohtonen P, Pajala A, Siira P, Leppilahti J. Augmented compared with nonaugmented surgical repair after total Achilles rupture. *J Bone Joint Surg Am* 2016; 98:85-92.
7. Grimm NL, Jacobs JC, Kim J, Amendola A, Shea KG. Ankle injury prevention programs for soccer athletes are protective: a level-I meta-analysis. *J Bone Joint Surg Am* 2016;98:1436-43.
8. Yeo ED, Lee K-T, Sung I, Lee SG, Lee YK. Comparison of all-inside arthroscopic and open techniques for the modified Broström procedure for ankle instability. *Foot Ankle Int* 2016;37:1037-45.
9. Serinken M, Eken C, Elicabuk H. Topical ketoprofen versus placebo in treatment of acute ankle sprain in the emergency department. *Foot Ankle Int* 2016;37:989-3.
10. Hunter JG, Dawson LK, Soin SP, Braumhauer, JF. Randomized, prospective study of the order of preoperative preparation solutions for patients undergoing foot and ankle orthopedic surgery. *Foot Ankl Int* 2016;37:478-82.
11. SanGiovanni TP, Kiezbak GM. Prospective randomized evaluation of intraoperative application of autologous platelet-rich plasma on surgical site infection or delayed wound healing. *Foot Ankle Int* 2016;37:470-7.



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