

AN UPDATE ON THE LITERATURE FOR FOOT AND ANKLE SURGERY 2014: Are We Practicing Evidence Based Medicine?

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This article summarizes recent Level I and Level II scientific articles related to foot and ankle surgery that were published between December 2013 and November 2014. The sources for these articles include *Foot and Ankle International* and *The Journal of Foot & Ankle Surgery*. A total of 5 Level I and 21 Level II studies were published during this time.

FOREFOOT

Morton's Neuroma

According to a Level II, prospective study (1) of 19 patients, a computer-based multimedia education module improved patients' understanding when used along with the standard verbal consent process for Morton's neuroma resection surgery.

HINDFOOT

Adult Acquired Flatfoot Deformity (AAFD)

In their Level II study, Matheis et al (2) were interested in assessing the surgical success of the flexor hallucis tendon transfer and medializing calcaneal osteotomy for the Stage IIb AAFD. They observed the changes in plantar pressures recorded on a TekScan HRMat and patient-generated outcome scores of 5 participants. The postoperative Short Form-36 scores and FAOS were significantly increased. There were no significant changes to the arch index values, but there was a significant increase in peak pressure in the lateral forefoot.

Plantar Fasciitis

Forty individuals with chronic recalcitrant plantar fasciitis were prospectively randomized in a Level I study by Monto et al into 2 groups (3). One group received an injection of 40 mg DepoMedrol cortisone and the other received 3cc autologous platelet rich plasma (PRP). Both injections were performed under ultrasound guidance. All participants went into a CAM walker for 2 weeks and received a stretching regimen after injection. Clinically significant and sustained improvements were seen for up to 2 years in the PRP group.

ANKLE

Ankle Ligament Injuries

In a Level I study by Prado et al (4), 186 patients with a first time type III lateral ankle injury were prospectively randomized into 2 treatment groups. One group was immediately placed into functional bracing. The other group was treated initially with 3 weeks in a walking boot followed by 3 weeks of functional bracing. Patients treated functionally had an earlier return to normal activities, and better clinical and functional conditions. The authors did note one unexpected outcome, the functionally treated group had the same level of pain as those immobilized and felt less discomfort walking.

Operative treatment for acute or chronic recurrent dislocation of peroneal tendons in young, active individuals is often recommended. In their Level II, prospective, nonrandomized, comparative study of 29 patients, Cho et al (5) reported that isolated retinaculum repair resulted in similar mean AOFAS and VAS scores, and mean time to return to sports activity as repair with groove deepening. The isolated repair group, however, was faster and simpler.

Jeong et al (6) looked at the presence and position of the inferior extensor retinaculum (IER) in their level II cohort study, and the practicality of reinforcing it in Broström procedures for chronic ankle instability. Due to anatomic variations, the IER could only be reinforced in 31 of 41 cases. All patients were followed for a minimum of one year. No statistically significant differences were noted between those who did or did not receive an IER reinforcement regarding AOFAS scores, stress radiography of talar anterior translation, or talar tilt.

Ankle Arthropathy

Total ankle replacement (TAR) has grown in popularity over the last couple of years for the treatment of advanced ankle arthropathy, especially in academic centers. Raikin et al (7) performed an epidemiological study of TAR and ankle fusion (AF) utilizing the Nationwide Inpatient Sample. A greater number of individuals with rheumatoid arthritis have received a TAR versus an AF. There has also been a trend to perform TAR in less healthy individuals. Overall, TARs are being performed in less healthy patients. AF is performed 6.15 times more often than TAR, and tended to be performed in younger, obese, diabetic individuals.

Lewis et al (8) prospectively looked at outcomes after 404 TAR with (70 procedures) and without (334 procedures) ipsilateral hindfoot fusion in their Level II comparative series. Mean patient follow-up was 3.2 years. The hindfoot fusion group had significant improvements in functional outcome and pain. Overall outcome, pain relief, and survivorship of implant however, was superior in the isolated TAR group.

In a level 2 prognostic study, Menendez et al (9) studied the National Health Discharge Survey (NHDS) database from 2001 through 2007. They identified preoperative and postoperative risk factors resulting in nonroutine discharge (transfer to rehabilitation facility, 21.2%) or prolonged hospitalization after ankle fusion in 40,941 patients. Risk factors for nonroutine discharge included advanced age, male sex, diabetes mellitus, atrial fibrillation, more than 1 general or surgery-related complication, additional days of care, and time period from 2005 to 2007. Risk factors for prolonged hospitalization included advanced age, female sex, diabetes mellitus, and postoperative complication.

In an attempt to gain information that will better inform individuals undergoing foot and ankle procedures, Chan et al (10) prospectively recruited 153 patients to walk through a standard airport metal detector set at building, airport, and airport enhanced settings. Unless individuals have additional hardware from other procedures outside the foot and ankle, particularly the remaining lower extremity, it is unlikely that they will be detected by walkthrough metal detectors at standard airport settings.

In a prospective, comparative, nonrandomized study of 229 patients, the effect of TAR with and without triceps surae lengthening was examined. Most variables of interest improved between preoperative and 1 year postoperative, regardless of whether a lengthening procedure was performed. The peak dorsiflexion angle and the ankle range of motion had a greater improvement in the lengthening groups, compared to TAR alone (11).

TRAUMA

Fractures

Primarily from an academic interest, Shibuya et al (12) looked at the epidemiology of foot and/or ankle fracture dislocations over a 4-year period in their Level II study. The most common fractures identified from ICD-9 codes were ankle fractures (56%), and the least common were midfoot fractures. Of the different variations of ankle fractures, bimalleolar were the most common. The data were collected from participating major trauma centers, and as the authors stated, oversampling was likely.

One hundred forty patients with Lauge-Hansen SER IV ankle fractures were fixated and assessed for syndesmosis

disruption. Twenty-four were found to have a positive stress test and those individuals were prospectively randomized to either syndesmotic screw fixation or no syndesmotic fixation. At a minimum of 4 years postoperative, no significant difference was found in functional outcome or radiologically between the two groups (13).

In a prospective case series by Erdem et al (14), 40 patients with posterior malleolar fractures were alternatively fixated with plate fixation and screw fixation via a posterolateral approach. Patients were followed for a mean of 38.2 months, and good AOFAS scores and ankle range of motion were obtained in both groups.

Walters et al (15) undertook a retrospective cohort study of 208 patients over a 4-year period, in an attempt to update the association of calcaneal and spinal fractures. Previously reported numbers were between 10-22%. The authors found a lower incidence of 7.21%, with the lumbar spine involved in 80% of the cases.

Although there is a lack of literature regarding metatarsal shaft fractures, the preferred treatment for displaced oblique spiral fractures of the fifth metatarsal has been nonoperative management. A Level II, prospective, cohort study by Aynardi et al (16) identified 142 acute fractures and followed them for a mean of 3.5 years. Patients were placed in a hard-soled shoe or fracture boot initially for 6 weeks of non-weightbearing and transitioned to full weightbearing with evidence of fracture healing. There was a 1.4% failure rate, with nonoperative management resulting in excellent, long-term functional outcomes.

Achilles Rupture

Groetelaers et al (17) followed 60 patients with Achilles tendon ruptures who underwent minimally invasive surgery. After 1 week in a below-knee splint placed in 10 degrees of plantarflexion, the patients were randomized to cast immobilization for 6 weeks or functional treatment with early mobilization and weightbearing. Results were equally good in both groups. Some differences noted included more complaints of pain early in the postoperative period of the functional group and more major complications such as DVT in the immobilization group despite prophylaxis.

Osteochondral Lesions of the Talus

In a prospective study of 30 patients with grade III and IV Outerbridge osteochondral lesions treated with transplantation of bone marrow-derived cells, participants were randomized to the control group or the experimental group. The experimental group received pulsed electromagnetic fields 4 hours per day for 60 days starting on the third postoperative. The experimental group had significantly higher AOFAS scores at final follow-up, significantly lower pain and better clinical outcome lasting more than 1 year after surgery (18).

MISCELLANEOUS

Foot Infections

Traditionally, an HbA1c of 7% has been used as the cutoff point for elective foot and ankle surgery. This was established by the American Diabetes Association, determined by assessing long-term sequelae of diabetes itself and not necessarily by assessing surgical outcomes. In their Level II study, Jupiter et al (19) assessed the relationship between postoperative infection and HbA1c to determine if 7% was a suitable cutoff. They found a steady increase of infection rates as HbA1c levels increased to 7.3%, from 7.3% to 9.8% there was a rapid increase and then the rates leveled off.

Patient-Reported Outcomes

With increasing evidence that there is a poor correlation between clinical measures and patient-reported outcomes (PRO), there has been an increased desire for an ideal PRO instrument. Hung et al (20) compared the validity and reliability of the Physical Function subscale of the Medical Outcomes General Health Survey (SF-36 PF) version 2, the Patient-Reported Outcomes Measurement Information System (PROMIS) Physical Function (PF) Computerized Adaptive Test (CAT), and the Lower Extremity (LE) CAT in their Level I diagnostic study that included 126 patients. Regarding the foot and ankle, the PF CAT and LE CAT were shown to be superior to the SF-36 PF. The authors suggest physicians and researchers use either of these 2 over the SF-36 PF if interested in PRO.

In another study by Hung et al (21) that is a Level I prospective comparative outcome study, PF CAT once again performed superior regarding reliability, responsiveness and efficiency in comparison to the Foot and Ankle Ability Measure–Activity of Daily Living subscale (FAAM_ADL), and the Foot Function Index 5-point verbal rating scale (FFI-5pt).

To further understand PRO from surgical procedures, the American Orthopedic Foot & Ankle Society (AOFAS) established the Orthopedic Foot and Ankle Outcomes Research (OFAR) Network consisting of ten sites from across the nation. Patients were prospectively enrolled if they were undergoing elective surgery for 1 of 6 foot/ankle disorders. Data was collected using the National Institutes of Health Patient Reported Outcomes Measurement Information System (PROMIS) preoperatively and up to 6 months postoperatively. A significant number of patients were lost to follow-up, something the group indicated required further effort. The goal is to establish large, prospective multicenter studies (22).

Self-reported Foot and Ankle Scores (SEFASs) and AOFASs were compared in 206 patients. Overall, SEFAS showed similar or better outcomes regarding test-retest

reliability, interobserver reliability by interclass correlation coefficient, internal consistency by Cronbach's coefficient alpha, and responsiveness by effect size. SEFAS was also completed 3 times faster and the authors concluded that the SEFAS be used for evaluation of patients with foot and ankle disorders (23).

Bone Graft

Although residual pain from iliac crest bone harvest grafting has been reported, no prospective studies have compared pain from other common lower extremity graft harvest sites. A level 2 prospective randomized multicentered comparative study by Baumhauer et al (24) compared 4 lower extremity sites, including the proximal tibia, the distal tibia, the calcaneus and iliac crest. Grafts procured from the lower extremity carried the most persistent pain with the calcaneus resulting in a 1 in 5 chance of clinically significant pain in the small number of participants (n = 20).

Foot Disorders

A cross-sectional analysis of 1,466 individuals from a community-based observation study of adults 50+ years old showed that an overpronated foot was associated with hallux valgus deformity and overlapping toes, especially in the obese. An oversupinated foot was more likely to be associated with plantar fasciitis in Caucasians (25).

Radiography

Fifty consecutive patients were enrolled in a prospective comparative study to evaluate the validity and reproducibility of common radiographic angles made with the EOS biplanar imaging system with simultaneously captures of anteroposterior and lateral images during weightbearing. The benefit of this imaging modality is reduced radiation exposure. Measurements were compared to conventional radiographs and the EOS biplanar imaging system allowed for reliable measurements except for the staggered foot position, which resulted in different limb length measurements in the rear leg (26).

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