

# Foot & Ankle Research Review

Making Education Easy

Issue 1 – 2009

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## Welcome to the first edition of Foot & Ankle Research Review.

The Foot & Ankle Review has been established to help make life easier for New Zealand professionals working in this area. Every month around 10,000 scientific publications are printed worldwide containing a multitude of new studies. Many are devoted entirely to the foot and ankle. In short, keeping up is hard and requires significant time to screen out what is irrelevant to your practice or your country. In essence, we aim to save you time sorting the 'wheat from the chaff' so you can spend more time doing what you're best at.

Foot & Ankle Research Review is a summary of what we think are some of the most significant new papers, plus a local commentary on why they are important and how they can potentially affect practice.

I have not chosen a particular theme in the first issue but have tried to cover a range of research topics that would be of interest to those people dealing with foot and ankle problems. I have recommended two articles that may be of interest to busy practitioners in the fields of diabetes and fungal nails. The first one relates to the use of vacuum cushioned removable cast walkers in the diabetic foot (Nagel & Rosenbaum, *Gait Posture*. 2009;30:11-15) and the second article describes a randomised clinical trial relating to the treatment of fungal nail infections (Malay DS et al, *J Foot Ankle Surg*. 2009;48(3):294–308).

The Review also provides website links to the abstract or fully published papers where possible so you can make your own judgements. If you have discovered or been involved in what you think is significant global research, please let us know and we will consider it for inclusion next time. If you have colleagues or friends within New Zealand who would like to receive our publication, send us their contact email and we will include them next issue. The creation of this publication would not have been possible without support from our sponsors and to them we give our thanks.

I hope you find our inaugural selection for Foot & Ankle Research Review stimulating reading, and we welcome your feedback.

Kind regards,  
Professor Keith Rome

## Hydrodebridement of wounds: effectiveness in reducing wound bacterial contamination and potential for air bacterial contamination

**Authors:** Bowling FL et al

**Summary:** The aim of this UK/US collaborative study was to determine the effectiveness of hydro surgery on bacterial reduction of a simulated infected wound and to assess the level of air contamination with bacteria after surgical hydrodebridement. The results demonstrated no statistically significant reduction in bacterial contamination of infected porcine samples post hydrodebridement. Analysis of passive air samples revealed a significant ( $p < 0.001$ ) increase in microbial counts post hydrodebridement. During removal of the wound dressing, a significant ( $p < 0.05$ ) increase in mean bacterial count was observed relative to basal counts in active air samples; the microbial load was still significantly raised 1 hour post-therapy.

**Comment:** The research presented is very interesting and of importance to those practising in the field of wound management. There is evidence from the literature that wound healing can be improved with surgical debridement and a general consensus among clinicians that debridement creates a favourable wound bed. Findings such as an increase in the percentage of granulation tissue and a marked decrease in slough have previously been reported. The study revealed that there is a potentially high risk of contaminating the peri-operative environment during the process of hydrodebridement, making cross infection a real possibility. Clinical location needs to be carefully considered prior to using hydrodebridement tools, particularly as hydro-surgery consoles are becoming increasingly used in community clinic settings worldwide. This is especially true in a clinical climate where there is increasing scrutiny on hospital-acquired infections.

**Reference:** *J Foot Ankle Res*. 2009;2:13

<http://www.jfootankleres.com/content/2/1/13>



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## Total sesamoidectomy for painful hallux rigidus: a medium-term outcome study

**Authors:** Tagoe M et al

**Summary:** In this UK study 33 patients who had undergone total sesamoidectomy (36 procedures) for the management of hallux rigidus/limitus were reviewed between 2 and 4 years postoperatively. The results of the study found no significant functional impairment or malalignment. There were no instances of pain on metatarsal compression, or of transfer metatarsalgia with or without callus formation. A statistically significant ( $p < 0.001$ ) improvement in The American Orthopaedic Foot & Ankle Society hallux clinical rating system was found between pre and post-operative scores.

**Comment:** This paper would be of interest to those who undertake surgical interventions for this common hallux problem. A review of the literature regarding surgery for hallux limitus and rigidus shows that current philosophy is based upon whether the joint is salvageable or not. Despite the many surgical procedures and treatment modalities described for this condition, the best method, or methods remain controversial. While foot and ankle surgeons will continue to publish data from their own experiences with certain techniques, this may not be universally applicable to all surgeons or patients. Since it has yet to be established what patients expect from their treatment, there is probably little to be gained from the publication of studies focusing on the different techniques available. The complications arising from hallux limitus and rigidus surgery seem to be quite well documented, and future research must be geared towards treatment to avoid some of these, such as 1st metatarsophalangeal joint stiffness after some procedures, lesser metatarsalgia, and loading patterns at the 1st metatarsophalangeal joint.

**Reference:** *Foot Ankle Int.* 2009;30(7):640-646

[http://www.newsletteronline.com/user/user.fas/s=563/fp=20/tp=37?T=open\\_summary.50026183&P=summary](http://www.newsletteronline.com/user/user.fas/s=563/fp=20/tp=37?T=open_summary.50026183&P=summary)

Research Review publications are intended for New Zealand health professionals.

## Vacuum cushioned removable cast walkers reduce foot loading in patients with diabetes mellitus

**Authors:** Nagel A and Rosenbaum D

**Summary:** The aim of this German study was to investigate the pressure-relieving effects of two commercially available vacuum orthoses in patients with diabetes mellitus. Twenty patients with plantar callosities but no ulceration were included and four walking conditions were tested; two vacuum orthoses, a post-operative shoe and an off-the-shelf shoe. Plantar pressure patterns were found to be significantly different between the four walking conditions. A significant increase in the contact area in the midfoot was evident with the vacuum orthoses. Peak pressures and maximum force showed a significant decrease under the forefoot and rearfoot and increased in the midfoot area during walking with both vacuum orthoses. The high-cut vacuum orthoses revealed significantly lower rearfoot pressures, but equal pressure relief under the forefoot compared to the post-operative shoe.

**Comment:** The article is of interest to those manufacturing orthoses or those dealing with the diabetic foot. The study measured plantar pressure distribution in four walking conditions in order to detect changes in foot loading. The vacuum orthoses provide individual support by adapting the insole to the foot shape based on a vacuum cushion in combination with a dampening insole. The vacuum orthoses are removable cast walkers using vacuum pads, a cushioning dual-density insole and a rocker bottom sole. There was no total contact cast included in this study, although it is the gold standard in the treatment of plantar ulcers in diabetic patients. The aim of this study was to evaluate the pressure relieving efficacy of the two vacuum orthoses in diabetic patients without acute ulcers and therefore it was not possible to apply a total contact cast to the subjects for a pressure measurement in this study. Furthermore, the efficacy of total contact casts is mainly evaluated in clinical trials concerning healing rates of acute ulcers. The clinical efficacy of the vacuum orthoses needs to be proven in clinical trials with the total contact cast as competitor.

**Reference:** *Gait Posture.* 2009;30:11-15

[http://www.gaitposture.com/article/S0966-6362\(09\)00059-9/abstract](http://www.gaitposture.com/article/S0966-6362(09)00059-9/abstract)

## Extracorporeal shockwave therapy for interdigital neuroma: a randomised, placebo-controlled, double-blind trial

**Authors:** Fridman R et al

**Summary:** The aim of this US trial was to evaluate the safety and efficacy of extracorporeal shockwave therapy as a treatment for destroying Morton's neuroma. Twenty five patients with a visual analogue scale (VAS) pain score of  $\geq 4$  were included in the study. The end point evaluation parameter was a reduction in VAS pain score, measured at 1, 6 and 12 weeks post-treatment. The treatment group showed a significant ( $p < 0.0001$ ) difference before and after extracorporeal shockwave therapy while there was no significant difference in the sham group after 12 weeks.

**Comment:** Extracorporeal shockwaves are high-pressure, low-frequency sound waves, generated by a device outside the body and applied to the affected tissue in a site-specific manner. Ultrasound guidance was used to assist with the positioning of the device and the procedure was performed with local anaesthesia. The mechanism by which extracorporeal shockwave therapy might have an effect on musculoskeletal conditions is not well defined. The study used only a small sample, with two patients from the sham group not completing the study. The randomised clinical trial was limited in respect to blinding, randomisation process and non-validated methods to assess pain. It is interesting to note that the intervention group demonstrated a 66% reduction in pain and the sham group a 33% reduction in pain. The current evidence suggests that there is some uncertainty about the efficacy, and that there may be a placebo effect associated with this procedure. Further work is needed in this area evaluating extracorporeal shockwave therapy against traditional techniques such as surgery or steroid injections.

**Reference:** *J Am Podiatr Med Ass.* 2009;99(3):191-193

<http://www.japmaonline.org/cgi/content/abstract/99/3/191>

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## Randomised controlled trial for clinical effects of varying types of insoles combined with specialized shoes in patients with rheumatoid arthritis of the foot

**Authors:** Cho NS et al

**Summary:** The aim of this Korean study was to determine the effects of specialised shoes with insoles in patients with rheumatoid foot lesions and the differences in terms of type of insole and anatomical location of foot pathology. In this controlled clinical trial, 42 patients with rheumatoid foot lesions were randomly assigned to one of two orthotic intervention groups. The anatomical locations of the foot lesions were recorded (hindfoot or forefoot). Participants were provided with an extra deep forefoot-rockered shoe and either a ready-made simple soft insole or a custom-made semi-rigid insole, to be worn for at least 3 hours per day over 6 months. The results demonstrated a significant ( $p < 0.05$ ) decrease in pain and function/disability scores at 6 months in both groups versus baseline, but between group comparison showed no significant differences in view of type of insoles and anatomical locations of foot pathology.

**Comments:** Foot orthoses are commonly used for the conservative management of foot problems in patients with rheumatoid arthritis. Many strategies for managing rheumatoid foot pain or deformities have been proposed, from simple soft orthoses to hard, custom-made orthoses, to limit pronation by holding the subtalar joint in a neutral position. The results of this single-blinded randomised controlled trial showed that in patients with rheumatoid foot problems, the continuous use of insoles combined with prescribed forefoot rockered shoes with wide toe-box resulted in a significant reduction in foot pain and dysfunction. However, no significant differences were found relating to the types of insoles and the anatomical locations of foot pathologies. It has previously been reported that custom-made functional hard foot insoles in rheumatoid arthritis patients with early correctable hindfoot valgus deformity can slow down the rheumatoid disease process. The results from this study are encouraging for those health care professionals dealing with this long-term chronic group. However, a limitation of the study was the lack of a 'no intervention' control group.

**Reference:** *Clin Rehab* 2009;23(6):512-521

<http://cre.sagepub.com/cgi/content/abstract/23/6/512>

## Treatment of plantar fasciitis using four different local injection modalities: a randomised prospective clinical trial

**Authors:** Kalaci A et al

**Summary:** This randomised multicentre study, involving 100 patients, examined the effectiveness of four different local injection modalities in the treatment of plantar fasciitis. Patients were divided into four equal groups and were treated using one of four different methods of local injection - autologous blood alone, an anesthetic combined with peppering, a corticosteroid alone, or a corticosteroid combined with peppering. Pain level was assessed using a visual analog scale and modified criteria of the Roles and Maudsley score pretreatment and at 3 weeks and 6 months after the injection. All four groups improved significantly ( $p < 0.001$ ) versus baseline. In the two groups in which local corticosteroid injections were used, excellent results were obtained, with a significantly ( $p < 0.05$ ) superior effect in the corticosteroid plus peppering group.

**Comments:** Various treatment modalities have been described for plantar fasciitis, including stretching, taping, foot orthoses, laser therapy and extracorporeal shock wave therapy. Palpation-guided injection of plantar fasciitis with corticosteroid preparations is a common and effective practice. In this study, the rate of successful outcome after autologous blood injection was significantly lower compared with the corticosteroid groups. Patients who underwent corticosteroid injections combined with peppering, to the maximum point of tenderness, had significant clinical improvement 6 months after treatment. The exact mechanism of action has not been elucidated, however, it is thought that peppering probably acts to create new channels through the degenerative myxoid tissue, in which bleeding occurs. This process may initiate the mode of healing in plantar fasciitis. The effectiveness and accuracy of the peppering technique may be enhanced by ultrasound guiding. The findings of this study suggest that local corticosteroid injection becomes more effective when combined with peppering in treating patients with plantar fasciitis. Peppering is a simple procedure and can be used in the outpatient clinic.

**Reference:** *J Am Podiatr Med Assoc.* 2009;99(2):108-113

<http://www.jpmaonline.org/cgi/content/abstract/99/2/108>

## The slipping slipper sign: a marker of severe peripheral diabetic neuropathy and foot sepsis

**Authors:** Teelucksingh S et al

**Summary:** The aim of this study was to evaluate the relationship between a positive slipping slipper sign (SSS) and diabetic peripheral neuropathy. The SSS is characterised by the unrecognised loss of slippers from one's feet while walking. Slippers are defined as varieties of casual footwear which all have one common feature of being open at the back and unstrapped at the ankles. Such footwear is widely used around the world and referred to varyingly as slippers, flip-flops (UK), thongs (Australia) and jandals (New Zealand). The study involved 105 diabetic outpatients without active foot sepsis, 40 diabetic inpatients with active foot sepsis, and 69 non-diabetic controls without active foot sepsis. Subjects were assessed for peripheral neuropathy and foot sepsis, and were asked to respond to the question "Have you ever lost your slipper from your feet while walking and not realised that you had done so?" The results demonstrated 64 of 145 diabetic patients had severe neuropathy and 53 of these patients had a positive SSS (83% sensitivity). Out of the 81 patients without severe neuropathy, 74 had a negative SSS (91% specificity). Diabetic patients with concurrent foot sepsis exhibited a higher frequency of severe neuropathy (70%) and positive SSS (65%) compared with those without (34% and 35%, respectively,  $p < 0.001$ ). Multivariate analysis revealed that a positive SSS was strongly related to the severity of neuropathy independent of the duration of diabetes.

**Comments:** Peripheral neuropathy is a major contributor to diabetic foot complications including ulceration, sepsis and limb loss, however, it is often overlooked and poorly evaluated in the clinical setting. This study demonstrated that diabetic peripheral neuropathy is associated with a positive SSS. It is also interesting that the mean duration of SSS prior to presentation with clinical disease was 2 years. This indicates a potential window of opportunity for timely prophylactic action against diabetic foot disease. Improper footwear has been implicated in up to one in three cases of foot ulceration leading to amputation. Slipping slippers may reveal strong clues to a neuropathic foot that is at high risk of trauma and infection. The SSS could possibly serve as a novel method of mass screening for identifying at-risk feet. It is simple, sensitive and has no cost implications. Further studies are warranted.

**Reference:** *Postgrad Med J* 2009;85:288-291

<http://pmj.bmj.com/cgi/content/abstract/85/1004/288>

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## Efficacy of debridement alone versus debridement combined with topical antifungal nail lacquer for the treatment of pedal onychomycosis: a randomised, controlled trial

**Authors:** Malay DS et al

**Summary:** In this clinical trial, 55 patients were randomly allocated to either nail debridement (27 patients; 160 toenails) or debridement plus application of ciclopirox 8% topical antifungal nail lacquer (28; 129). The primary outcome was mycological cure. Secondary outcomes included foot-related quality of life, and a number of clinically important toenail characteristics. Median follow-up was 10.5 months (range 3.25-14.25). At follow-up, patients in the antifungal nail lacquer group improved significantly more than those in the debridement alone group (76.74% rate of mycological cure compared with no mycological cure in the debridement-only group). Both treatment groups exhibited a significant improvement in foot-related quality of life (Bristol Foot Score) and mycotic toenail thickness.

**Comments:** Pedal onychomycosis is a common malady caused by saprophytes, dermatophytes and yeasts. Traditional treatment options include toenail debridement and pharmacological therapies that range from the application of topical agents to the administration of oral antifungal medications. The results from this study demonstrated that debridement of mycotic toenails improves patients' subjective foot-related quality of life, and that the addition of topical antifungal nail lacquer to a debridement regimen provides a reasonable likelihood of curing the fungal infection. The results of this investigation support the idea that thorough toenail debridement is a prerequisite to mycological cure.

**Reference:** *J Foot Ankle Surg.* 2009;48(3):294-308.

[http://www.jfas.org/article/S1067-2516\(08\)00532-2](http://www.jfas.org/article/S1067-2516(08)00532-2)



**Independent commentary by Professor Keith Rome, School of Podiatry, AUT University, Auckland.**

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## Clinical audit of foot problems in patients with rheumatoid arthritis treated at Counties Manukau District Health Board, Auckland, New Zealand

**Authors:** Rome K et al

**Summary:** The aim of this study was to undertake a clinical audit of foot problems in patients with rheumatoid arthritis (RA) treated at Counties Manukau District Health Board. One hundred patients with RA were included in the study with a median age of 60 (Interquartile range [IQR]: 51-64) years. Median disease duration was 15 (IQR: 7.3-25) years. Over 85% presented with foot lesions, which included corns and callus over the forefoot region, and lesser toe deformities. Moderate to high disability and high levels of forefoot structural damage were observed. A high percentage of patients had not seen a podiatrist, had no previous formal foot assessment and wore inappropriate footwear.

**Comments:** At diagnosis, 16% of RA patients may have foot joint involvement, increasing to 90% as disease duration increases. This can lead to joint instability, difficulties in walking and limitation in functional ability that restricts activities of daily living. The podiatrist plays an important role in the multidisciplinary team approach to the management of foot problems. This clinical audit suggests that the majority of RA patients suffer from foot problems. Despite the high prevalence of foot disease in RA, this problem is often trivialised or under-appreciated. Expertise in dealing with foot problems is often limited among health care professionals, and it has been argued that better integration of podiatric services into rheumatology services would be beneficial.

**Reference:** *J Foot Ankle Res.* 2009;2:16

<http://www.jfootankleres.com/content/2/1/16>

## Footbed shapes for enhanced footwear comfort

**Authors:** Witana CP et al

**Summary:** Thirty-two females participated in a clinical trial where heel seat length, heel seat inclination and heel height were investigated using the profile assessment device. The dependent variables were perceived feeling and plantar pressure. The results demonstrated that both heel seat length and heel wedge angle play an important role in the perceived feel of high-heeled shoes. Perceived feel was best for wedge angles of 4° and 5° at a heel height of 25mm, wedge angles of 10° and 11° at a heel height of 50mm and wedge angles of 16° and 18° at a heel height of 75mm.

**Comments:** A shoe wearer's comfort is related to the shape of the shoes footbed and it is well recognised that insole shape is important in footwear design. However, there exists no methodology to evaluate the existing guidelines used in last making. Further investigation needs to be carried out to quantify the validity of the comfortable shapes under dynamic conditions such as walking or running, as well as to identify comfortable shapes for other heel heights. The subjective preference for different footbed shapes is important for designing good fitting footwear. It would be interesting to evaluate the term 'comfort' from a psychological perspective.

**Reference:** *Ergonomics* 2009;52(5):617-628

<http://dx.doi.org/10.1080/00140130802419503>



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