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Abbreviations used in this issue

CECS = chronic exertional compartment syndrome
ESWT = extracorporeal shock wave therapy
IWGDF = International Working Group on the Diabetic Foot

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Foot and Ankle Research Review

Welcome to Issue 28 of Foot and Ankle Research Review.

The manuscripts I have selected for this issue are all topics directly related to discussions I have had in the past few months. I would particularly draw your attention to the very good review on foot melanoma. I was very interested to read the Framingham study relating to region-specific foot pain and plantar pressure, in light of the recent increase in foot orthoses that are manufactured based on plantar foot pressures. Management of Achilles tendon and exertional compartment problems are a challenge, so I have included two systematic reviews to enhance knowledge surrounding surgical management. I am very interested in what your thoughts are of the recommendations for interventions for diabetic foot ulcers provided by the IWGDF. What is clear is that more quality research is required in this area. I have again highlight paediatrics, in particular, management of clubfoot. It is pleasing to see the knowledge base ever increasing in paediatric conditions related to the foot and ankle.

Research Review is ten!! The first ever issues of Research Review were delivered to inboxes in February 2006. Fast forward ten years and we now publish 48 regular reviews to which there are over 160,000 subscriptions. We're grateful to each and every one of you for your support and are looking forward to even bigger and better things over the coming years.

I hope you enjoy the selection of studies in this review. I look forward to your feedback.

Kind regards,

Dr Matthew Carroll

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Surgical treatment for midportion Achilles tendinopathy: a systematic review

Authors: Baltes TP et al.

Summary: This systematic review evaluated literature from MEDLINE, EMBASE and the Cochrane database on the surgical treatment for midportion Achilles tendinopathy. Among 23 reviews meeting the study inclusion criteria, the results of 1285 procedures in 1177 cases were reported. Surgical techniques were separated into five categories: open surgical debridement (11 studies); minimally invasive procedures (seven); endoscopic procedures (three); open gastrocnemius lengthening (one); open autologous tendon transfer (one). Patient satisfaction and complication rates varied widely across the studies (69-100% and 0-85.7%, respectively). Lower complication rates were seen with minimally invasive and endoscopic procedures than with open procedures.

Comment: This review investigated patient satisfaction and complication rates relating to five Achilles tendon surgical procedures; open surgical debridement, minimally-invasive procedures, endoscopic procedures, gastrocnemius lengthening and autologous tendon transfer. The results of this review should be interpreted with caution due to inconsistencies in the reporting of the primary and secondary outcome measures and the large number of heterogeneous outcome measures used to measure functional outcome and pain.

Clinical Perspective: Despite providing a low level of evidence, the review does provide the clinician awareness of surgical techniques available. Additionally, the review demonstrated the variation in the techniques with regard to patient satisfaction and complication rates.

Reference: *Knee Surg Sports Traumatol Arthrosc.* 2016; Mar 12 [Epub ahead]
[Abstract](#)

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Foot Science
International

Associations of region-specific foot pain and foot biomechanics: The Framingham Foot Study

Authors: Riskowski JL et al.

Summary: Plantar pressure and force pattern differences between adults with and without region-specific foot pain were evaluated in this analysis of data from participants in the Framingham Foot Study. Plantar pressure and force data were collected while walking barefoot at a self-selected pace and foot pain evaluated by self-report, and grouped by foot region (toe, forefoot, midfoot, or rearfoot) or regions (two or three or more regions) of pain. During walking, significant differences were found between those with and without regional foot pain in plantar loading and propulsion (2-4%), normalised maximum vertical force (5.3-12.4%) and plantar pressure (3.4-24.1%). Participants with proximal foot (rearfoot or midfoot) pain had different maximum vertical forces compared to those without regional foot pain (referent), while those with distal foot (forefoot or toes) pain had similar maximum vertical forces under the pain region.

Comment: Some very thought-provoking results emerge from this research. First, foot pain was not uniformly associated with decreases or increases in plantar foot pressures in the toes, forefoot or midfoot regions of the foot. Second, those with rearfoot pain had significant decreases to rearfoot plantar pressures. The authors pose a great question based on their results, should interventions for region specific foot pain be uniform?

Clinical Perspective: This research emphasises the importance of foot pain to the clinician. Additionally, results support the use of quantifying plantar foot pressures by those involved in the rehabilitation of foot pain. This is well worth a read as it may challenge some of your thoughts on management strategies related to foot pain.

Reference: *J Gerontol A Biol Sci Med Sci* 2015;70(10):1281-8

[Abstract](#)

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Disclaimer: This publication is not intended as a replacement for regular medical education but to assist in the process. The reviews are a summarised interpretation of the published study and reflect the opinion of the writer rather than those of the research group or scientific journal. It is suggested readers review the full trial data before forming a final conclusion on its merits.

Research Review publications are intended for New Zealand health professionals.

Orthosis-shaped sandals are as efficacious as in-shoe orthoses and better than flat sandals for plantar heel pain: A randomized control trial

Authors: Vicenzino B et al.

Summary: The efficacy of a contoured sandal being marketed for plantar heel pain was investigated in this Australian study, using a flat flip-flop and contoured in-shoe insert/orthoses as a comparison. A total of 150 volunteers (mean aged 50 years) with plantar heel pain of greater than 4-weeks duration were recruited and randomised to receive either the commercially available contoured sandals (n = 49), flat flip-flops (n = 50) or over the counter, pre-fabricated full-length foot orthotics (n = 51). At 12 weeks, wearers of the contoured sandal were 68% more likely to report improvement on the 15-point Global Rating of Change scale (GROC) and 61% more likely to report improvement on the 20-item Lower Extremity Function Scale (LEFS) compared to wearers of the flat flip-flop. No differences were observed between the contoured sandal and the shoe insert.

Comment: Contoured sandals have had an ever increasing market presence in the past 5 years. Over a 12-week period in this cohort with plantar heel pain, levels of self-reported improvement were assessed through comparison of contoured sandals compared to flat sandals and contoured insoles. The non-measurement of first step heel pain over the 12-week period and lack of blinding to the treatment were limitations of the study.

Clinical Perspective: The study adds positively and is supportive of existing literature surrounding the use of prefabricated foot devices in the short-term management (3 months) of plantar heel pain. The authors suggest that contoured sandals produce effects beyond that of placebo. Anecdotally, is this observed by those in clinical practice?

Reference: *PloS One* 2015;10(12):e142789

[Abstract](#)

The effect of step rate manipulation on foot strike pattern of long distance runners

Authors: Allen DJ et al.

Summary: The effect of step rate manipulation to change foot strike pattern in runners from a heel strike pattern to a non heel strike pattern was evaluated in this study. A total of 40 shod recreational runners who run with a heel strike pattern and covered over 10 miles weekly were recruited. A metronome was used to increase step rate above the runner's referred step rate by 5%, 10% and 15%, and 2D video motion analysis used to determine foot strike pattern and foot inclination angle at initial contact for each step rate condition. At both 10% and 15% step rates above preferred rate, statistically significant changes in foot strike pattern from a heel strike pattern to a midfoot or forefoot strike pattern were observed; seven (17.5%) participants at 10% step rate increase and 12 (30%) at 15%. A statistically significant reduction in mean foot inclination angle at initial contact was seen as step rate increased.

Comment: This study of 40 recreational runners presented data indicating that manipulation of step rate may be an effective method of changing foot strike patterns. Data indicated that manipulation of step rate can effect change to heel strike patterns and foot inclination angles.

Clinical Perspective: Changing foot strike pattern from a heel strike pattern to a midfoot or forefoot strike pattern through running gait retraining may be one way to accomplish a reduction of impact forces and reduce running-related injuries.

Reference: *Int J Sports Phys Ther* 2016;11(1):54-63

[Abstract](#)

Independent commentary by Dr Matthew Carroll

Matthew graduated in podiatry at the CIT in Wellington. He undertook his postgraduate work at Otago University, Dunedin, New Zealand, Curtin University, Western Australia and Auckland University of Technology, Auckland, New Zealand. He is Head of Podiatry and Senior Lecturer at Auckland University of Technology, Director/Treasurer of the Australia New Zealand Podiatry Accreditation Council and a Board member of the Podiatrists Registration Board of New Zealand. He has a special interest in inflammatory arthritis and is active in research in rheumatoid arthritis, gout and lupus.



Surgical management for chronic exertional compartment syndrome of the leg: A systematic review of the literature

Authors: Campano D et al.

Summary: This systematic review examined the published literature from 1970 through February 1, 2015, in order to characterise the at-risk demographic, operative indications, surgical techniques, functional outcomes, and reoperation and complication rates after operative management of chronic exertional compartment syndrome (CECS) of the lower leg. A total of 24 studies involving 1596 patients (mean age 26.6 years; 70% male) met the inclusion criteria. Military service members and athletes (83% recreational; 9% college level; 8% either national, international or professional) made up the majority of the study population (54 and 29%, respectively). The anterior compartment (51%; 95% CI 48.6%-52.3%) was the most commonly involved compartment, followed by the lateral (33%; 95% CI 31.4%-34.9%), deep posterior (13%), and superficial posterior (3%) compartments; the cumulative posterior involvement rate was 16% (95% CI 15.1%-17.8%). During a mean follow-up of 48.8 months, six patients underwent revision surgery. Complications included postoperative neurologic dysfunction and infection, and occurred in 13% of patients. Approximately two-thirds of all young athletes experienced successful primary operative management of lower-extremity CECS, and 84% were satisfied with their surgical outcomes at short- to mid-term follow-up. The study authors concluded that while open fasciotomy remains the predominant surgical technique, its comparative efficacy relative to newer endoscopic or other minimally invasive techniques is not known.

Comment: The review highlights the success of primary operative management for this condition in a young athletic population where open fasciotomy remains the predominant surgical technique. Despite the inherent limitations acknowledged by the authors, the review provides the clinician a good general knowledge base surrounding surgical options.

Clinical Perspective: For those involved in conservative management of this condition, many treatment dilemmas can arise. Knowledge surrounding surgical options and outcomes is paramount, particularly for those involved in postoperative rehabilitation.

Reference: *Arthroscopy* 2016;Mar [Epub ahead of print]
[Abstract](#)

IWGDF guidance on the prevention of foot ulcers in at-risk patients with diabetes

Authors: Bus SA et al.

Summary/Comment: This document from the International Working Group on the Diabetic Foot (IWGDF) provides 13 recommendations for interventions for diabetic foot ulcers. The IWGDF provide rationales, based on systematic review of the literature, as to how recommendations were reached and their strength and the quality of evidence.

Clinical Perspective: There are numerous points that will spark good debate following a review of these recommendations. There are some very pertinent points raised in the section titled 'key controversies'. The 13 recommendations made by this group will be of interest to any clinician engaged in management of diabetic foot ulcers. A striking feature of the majority of recommendations is the low quality of evidence available. This further supports the desperate need for more high-quality research into diabetic foot ulcerations.

Reference: *Diabetes Metab Res Rev.* 2016;32(Suppl 1):16-24
[Abstract](#)

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A longitudinal review of gait following treatment for idiopathic clubfoot: Gait analysis at 2 and 5 years of age

Authors: Jeans KA et al.

Summary: This study examined the long-term effects of growth and surgical intervention on gait following non-operative and surgical interventions for clubfoot in 181 children (276 clubfeet) at 2 and 5 years of age. Initially all feet were treated with either the Ponseti casting technique (n = 132) or French physical therapy method (n = 144) but by 5 years, 30 Ponseti and 61 physical therapy treated feet required surgery. Gait analysis indicated limitations primarily in the surgically treated feet. Following surgical intervention, normal ankle motion was observed in 17% of Ponseti treated feet and 21% of physical therapy treated feet by age 5. Surgically treated physical therapy feet showed persistent intoeing at both 2 and 5 years of age. Among surgically managed feet, those initially receiving physical therapy had a clinically significant reduction in ankle power versus Ponseti treated feet. Feet receiving a full posteromedial release had significantly less ankle power than those receiving limited release or tendon transfer surgery, or those who were still non-operative at 5 years of age.

Comment: This longitudinal study was designed to monitor changes seen in gait patterns of children treated surgically and non-operatively (physical therapy & Ponseti) for clubfoot as they grew (ages 2 & 5 years) and to see whether early gait differences persist or normalise over time. Data supports that clubfeet treated non-operatively have more normal gait than those that have undergone surgical management.

Clinical Perspective: Of significance was the finding surrounding ankle power in the surgical group. When the participants were reviewed at 5 years of age the authors conclude that surgical release of the clubfoot, regardless of the form of initial treatment, compromises push-off and creates gastrocsoleus weakness. Of note for the clinician in these patients is a reduction in ankle plantar flexion and increasing angles of intoeing. It will be interesting to see the next installment of data from this group as the cohort is followed in the future.

Reference: *J Pediatr Orthop.* 2015;May 12 [Epub ahead of print]
[Abstract](#)



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Epidemiology of shoe wearing patterns over time in older women: Associations with foot pain and hallux valgus

Authors: Menz HB et al.

Summary: In a survey of 2627 women aged 50-89 years, women's shoe wearing patterns and associations between footwear characteristics and foot pain and hallux valgus were evaluated. The survey indicated that the use of shoes with a high heel and very narrow toe box was common when participants were aged 20 and 29 years, but their use decreased to <10% by the age of 40 years. When compared to those who wore a very-wide toe box shoe, the likelihood of hallux valgus was greater in those wearing a wide (OR 1.96; 95% CI 1.03-3.71), narrow (OR 2.39; 95% CI 1.29-4.42) or very narrow (OR 2.70; 95% CI 1.46-5.00) toe box from age 20-29 years or a very narrow toe box (OR 1.93; 95% CI 1.10-3.39) from 30-39 years.

Comment: Features of women's footwear such as an elevated heel and a constrictive toe box may contribute to the development of foot pain and deformity. Studies have revealed that heel elevation increases the pressures under the metatarsal heads, limits motion of the first metatarsophalangeal joint, and increases the stiffness of the Achilles tendon.

Clinical Perspective: This large population-based study evaluating associations between footwear characteristics, foot pain and hallux valgus provides great guidance for the clinician. The 20-39 age group appears to be a key demographic where poor choice may be detrimental. Avoiding constrictive footwear between the ages of 20-29 may help prevent the development of hallux valgus. Interestingly, the authors also reported no association between hallux valgus and heel height of footwear worn between the ages of 20-29 years or 30-39 years, or between the hallux valgus and total number of decades of exposure to high heels.

Reference: *J Gerontol A Biol Sci Med Sci.* 2016;Feb 1 [Epub ahead of print] [Abstract](#)

Laser therapies for onychomycosis - critical evaluation of methods and effectiveness

Authors: Francuzik W et al.

Summary: This review assessed the use of laser therapies for onychomycosis based on 22 reports (926 initial search hits) from peer-reviewed journals or published as white papers. Most studies (81.82%) used an Nd:YAG laser. 47.4% used a 1064 device and reported that all treated patients responded positively. 60% of studies reported a complete cure (no clinical symptoms, nor negative mycology) in ≥50% of patients. Few adverse events were reported and they were of mild intensity across all studies.

Comment: The use and availability of laser light sources in the treatment of onychomycosis has rapidly evolved in the last 5 years.

Clinical Perspective: I have waited for some time now for a systematic review to bring the evidence together on this topic. The review emphasises the uncertainty many clinicians face when considering the move towards the use of, and investment in this modality. Specifically, limitations are: the inconsistencies in reported outcomes of studies, the majority of studies are small, uncontrolled and non-randomised, numerous laser settings are reported, treatment procedures are inconsistent, varied reporting of adverse effects and inconsistent guidance surrounding follow up time. Whilst there is low level evidence of effectiveness and instances where laser treatment is preferable in patients with contraindications for oral antifungal pharmacotherapy, high-quality clinical trials are required. There are no long-term study results exceeding 18-months post therapy that have been reported to date.

Reference: *J Eur Acad Dermatol Venereol.* 2016;Mar 8 [Epub ahead of print] [Abstract](#)

Melanoma of the foot

Authors: Bristow I and Bower C

Summary: This review examines the clinical features of melanoma arising on the foot, which has several unique characteristics compared with cutaneous melanoma arising elsewhere in presentation and prognosis. It is frequently delayed in presentation and diagnosis, in part due to a highly variable plantar surface and nail unit appearance. The CUBED (Coloured, Uncertain diagnosis, Bleeding, Enlargement, Delay) acronym can aid foot melanoma diagnosis and use of a dermatoscope can improve assessment of suspicious lesions. New drug therapies that target known melanoma mutations, such as BRAF mutations targeted by vemurafenib, dabrafenib and trametinib, and the KIT mutation targeted by imatinib, may extend survival times for patients with the disease.

Comment: Foot melanoma has its own unique peculiarities and clinically may present a greater diagnostic challenge because lesions often are presented and diagnosed late, adversely affecting outcomes.

Clinical Perspective: This is a must read for all clinicians involved in the management of the foot and ankle. The review article provides a comprehensive overview of the types of melanoma, the clinical presentation of melanomas to the foot and the nail unit. Of particular note to melanomas to the nail unit is the use of the CUBED acronym, if you have not encountered this before, it is well worth your time to read this article. The manuscript also provides guidance surrounding the use of dermoscopy, a hand held device that will aid your diagnosis of skin lesions and is well worth the investment.

Reference: *Clin Podiatr Med & Surg.* 2016;Apr 13 [Epub ahead of print] [Abstract](#)



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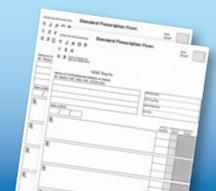
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Diabetes & Obesity Research Review Issue 104

Key points from the review:

- Need to encourage all adolescents to exercise regularly due to long-term risk of obesity and lack of fitness & CV risk later in life.
- Reducing weight gain (even modest weight loss) in high-risk individuals (including rural women) does reduce rates of type 2 diabetes.
- Structured self-management education programmes are an important part of a quality diabetes service and help to reduce emergency diabetes-related incidences.

Application to my practice:

Making time to work with people towards manageable, realistic and incremental lifestyle adjustments has considerable benefits in terms of managing diabetes and reducing CV risk.

Length of time given to each review: 30 minutes

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