Foot & Ankle Research Review™

Making Education Easy

Issue 38 – 2018

In this issue:

Abbreviations used in this issue:
AP = anteroposterior
HVA = hallux valgus angle
JHV = juvenile hallux valgus
OR = odds ratio
PHP = plantar heel pain
PTTD = posterior tibial tendon dysfunction
SCC = squamous cell carcinoma

Podiatrists Board of New Zealand

Welcome to Issue 38 of Foot and Ankle Research Review.

I particularly enjoyed a few of the manuscripts featured in this Issue. The manuscript by Menz et al., looking at the relationship between calcaneal spurs and plantar fascial thickness is interesting, and for me reinforces the need to be precise with the diagnosis of plantar heel pain and not assume it is just plantar fasciitis. Morrison's review of children's footwear highlights how little we know about, and the degree of anecdotal assumptions that are made about, children's footwear.

I hope you enjoy this issue and please keep the feedback coming in.

Kind regards,

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Research Review thanks Foot Science International for their sponsorship of this publication, and their support for ongoing education for healthcare professionals.

Coexistence of plantar calcaneal spurs and plantar fascial thickening in individuals with plantar heel pain

Authors: Menz HB et al.

Summary: This study across four general practices used data from a health survey to identify individuals reporting foot pain within the last 12 months, who then underwent clinical examination (n = 530) to ascertain relationships between plantar calcaneal spurs, plantar fascia thickening and plantar heel pain (PHP) and the utility of tenderness on heel palpation for differentiation between these conditions. Plantar calcaneal spurs were identified in 26.5% of participant's feet and plantar fascia thickening in 47.3% of participant's feet, frequently coexisting (20.4%); isolated plantar calcaneal spurs were rare (6.0%). Those with PHP were more likely to have a combination of these features versus those without PHP (OR 2.16; 95% CI 1.24-3.77; p = 0.007). Tenderness on heel palpation was not associated with plantar calcaneal spurs or plantar fascia thickening.

Comment: This study further emphasises the complex nature of PHP. Data demonstrated that calcaneal spurs and plantar fascial thickening frequently occur together. Isolated spurs with no facial thickening were uncommon. The role of calcaneal spurs in plantar heel pain is again questioned, as previous studies have shown between 10% and 63% of people who are asymptomatic have calcaneal spurs. The study reinforces that thickening of the plantar fascia appears to be a characteristic feature of PHP; however, the mechanism between linking pain and fascial thickness is not understood. The data also indicated that the association between PHP and calcaneal spurs was largely driven by the presence of fascial thickening. The study also questions the use of heel palpation as it could not differentiate between the presence of fascial thickening and calcaneal spurs. This study raises the possibility of subgroups of pathology that may exist in people with painful PHP.

Reference: Rheumatology (Oxford). 2018;Sep 10 [Epub ahead of print]
Abstract

Self-reported social and activity restrictions accompany local impairments in posterior tibial tendon dysfunction: a systematic review

Authors: Ross MH et al.

Summary: This meta-analysis of data from 10 published studies was conducted to quantify clinical impairment, pain and disability in patients with posterior tibial tendon dysfunction (PTTD) versus controls. Strong effects occurred for poor heel rise endurance (standardised mean difference [SMD] -1.52; 95% CI -2.05 to -0.99), and lower forefoot adduction-inversion strength (SMD -1.19; 95% CI -1.68 to -0.71) and arch height (SMD -1.76; 95% CI -2.29 to -1.23). Versus controls, PTTD patients had greater self-reported stiffness (SMD 1.45; 95% CI 0.91-1.99), difficulties caused by foot problems (SMD 1.42; 95% CI 0.52-2.33) and social restrictions (SMD 1.26; 95% CI 0.25-2.27).

Comment: A complex and debilitating musculoskeletal condition that can lead to gait dysfunction and decreased functional ability. Pooled data indicated individuals with PTTD have reduced capacity to perform repeated and single unilateral heel rise, reduced isometric forefoot adductor and invertor strength and lower arch height compared to controls. This provides good evidence that PTTD is likely to result from a combination of both impaired muscle function and postural deformity. Data also demonstrated significant impairments including lower self-reported function, greater pain levels, functional difficulties and social limitations. Applying the study findings to practice, assessment and quantification of the ability to perform heel raises, forefoot adduction and inversion strength, arch height and muscle function at the hip are paramount. Management of the condition should address arch height, muscle strength and also be cognisant of the significant functional and social impact of the condition.

Reference: J Foot Ankle Res. 2018;11:49
Abstract

Incorrectly fitted footwear, foot pain and foot disorders: a systematic search and narrative review of the literature

Authors: Buldt AK and Menz HB

Summary: This narrative review sought to determine the prevalence of incorrectly fitted footwear and any association with foot pain and foot disorders. Data from studies indicated that 63-72% of participants wore shoes that did not properly accommodate the width or length of their feet. Incorrect footwear fitting was associated with foot pain and foot disorders including lesser toe deformity, corns and calluses. Specific participant groups, including children with Down syndrome, older people, and people with diabetes, were more likely to wear shoes that were too narrow (46-81%).

Comment: For clinicians who routinely prescribe and fit footwear, often convincing people that they are indeed in an incorrect shoe, and that they have been wearing the wrong size, is a challenge. The review provides some interesting clinical points. Incorrect fitting can be defined as incorrect length, width and depth. Incorrect fitting footwear is associated with foot pain and poorer foot health. In adults, footwear that is too tight and short is common. It is recommended that there is 10–20 mm clearance between the end of the foot and the shoe. Older people often wear footwear that is too long, this is to provide extra width to accommodate foot deformities, particularly to the forefoot. In diabetic patients, the relationship between incorrect fitting footwear that causes minor trauma is the most common precipitating factor in the development of diabetic foot ulcers. Between sexes, women experience more foot pain due to tight fitting footwear. As seen by the conclusion of the study (63-72%) of people may be wearing incorrectly sized footwear, demonstrating that fit should be considered as the driving factor for footwear selection. If only fashion did not come into the equation!

Reference: J Foot Ankle Res. 2018;11:43
Abstract

Big issues for small feet: developmental, biomechanical and clinical narratives on children's footwear

Authors: Morrison SC et al.

Summary: This narrative review assessed developmental, biomechanical and clinical studies that examined the effects of footwear on foot development in children. The evidence suggests a need for progress in children's footwear science and the development of an understanding of the interaction between the foot and shoe.

Comment: This review demonstrates the lack of empirical evidence surrounding children's footwear. The baseless assumptions that are made surrounding children's footwear are explored from three perspectives: developmental, biomechanical and clinical. It is clear that there is little evidence that footwear alters foot morphology in children. However, this point will remain an area of debate due to the complexities of exploring development. From a biomechanical perspective there is evidence that footwear alters gait characteristics such as walking velocity, step length and stride length in children aged 1.5 to 16 years of age. Whether shoes should be soft and flexible or hard and stiffer is a contentious point, but again there is no evidence to inform guidance. Clinically, there is a great deal of education provided around correct footwear choice for children, but the effects of footwear choices and functional outcomes of foot health are poorly understood. This review highlights how little we know about children's footwear.

Reference: J Foot Ankle Res. 2018;11:39
Abstract

Independent commentary by Associate Professor Matthew Carroll

Matthew is Associate Professor of Podiatry and Head of Postgraduate Programmes within the School of Clinical Sciences at the Auckland University of Technology. He 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. His research areas include investigating musculoskeletal function in the lower limb in inflammatory arthritis. He is active in the supervision of higher degree students. He is Associate Editor for BMC Musculoskeletal Disorders and is an Editorial Board Member for the Journal of Foot & Ankle Research.

Radiographic evaluation of first metatarsal and medial cuneiform morphology in juvenile hallux valgus

Authors: Kaiser P et al.

Summary: This study examined the pattern of radiographic deformity associated with juvenile hallux valgus (JHV) based on standing radiographs of 93 feet from 57 JHV patients and 50 feet from 36 normal patients. 70 (75%) of the JHV feet had mild-to-moderate JHV (average hallux valgus angle [HVA] 26.2°), and 23 feet (25%) had severe JHV (average HVA 41.9°). Multivariate analysis suggested that distal metatarsal articular angle (DMAA; $p < 0.001$), medial cuneiform angle ($p = 0.04$), and congruency ($p < 0.001$) were independently associated with JHV severity (normal vs mild-to-moderate vs severe). Severe JHV feet had larger DMAA ($p = 0.01$), greater intermetatarsal angle ($p = 0.01$), larger relative first to second metatarsal length ratio ($p = 0.02$), and were less often congruent ($p = 0.03$) versus mild-to-moderate JHV feet.

Comment: A very thought-provoking manuscript for those who conservatively manage JHV. Often the decision of when to refer for surgery or providing a prognosis surrounding the progression of JHV is difficult. There are a few good take-home points in this manuscript that will help with these decisions. Firstly, the manuscript provides a good refresher for many with regard to the calculation of angles from plain film x-rays. Notably the manuscript emphasises the importance of the HVA, the intermetatarsal angle (IMA), the relative first to second metatarsal length ratio and the DMAA. Data indicated strong correlations between hallux valgus deformity and the DMAA and IMA. These findings implicate the medial cuneiform as an aetiological factor in the development of JVA. The DMAA was also independently associated with JHV severity, suggesting the DMAA is the main driver of JHV severity. The interplay between a relatively long first metatarsal and HV severity remains unclear, but this is likely a cofactor in the aetiology of the deformity. Data also indicating that severe JHV cases had a larger first to second metatarsal length ratio compared to mild-to-moderate JHV cases. Therefore, the relative length of the first metatarsal should be taken into account in cases of JHV and likely correlates with severity.

Reference: Foot Ankle Int. 2018;39(10):1223-28
Abstract

Foot mobilization and exercise program in combination with toe separator improves outcomes in women with moderate hallux valgus at the one-year follow-up: a randomized clinical trial

Author: Abdalbary SA

Summary: This randomised controlled trial tested the effects of a programme of foot mobilisation and exercise (36 sessions over 3 months) in conjunction with a toe separator, on symptomatic moderate hallux valgus in 56 female patients. After 3 months, the intervention resulted in a greater improvement in pain (mean decrease 2.4/10 point scale; ($p < 0.001$), the American Orthopedic Foot and Ankle Society score increased from a mean of 46.1 points to 76.2 points ($p < 0.001$), the mean ankle dorsiflexion passive range of motion increased from 9.5º to 15.2º ($p < 0.001$), the mean hallux plantar flexion and abduction strength increased from 50 N to 65.9 N ($p < 0.001$) and 6.4 N to 10.5 N ($p < 0.001$), toe grip strength increased from 65.2 N to 98.1 N ($p < 0.001$), mean radiographic angular measurements of mean HVA decreased from 32.7° to 23.8° ($p < 0.001$) and the first to second intermetatarsal angle decreased from 14.0° to 11.8° ($p < 0.001$). These improvements persisted for 12 months. In controls, there were no improvements after 3 or 12 months.

Comment: Pragmatically the study demonstrates that a combination of conservative therapies in patients with mild hallux valgus produced changes in pain levels, decreases in angulation of deformity and increases in muscle strength. The results must be considered against some methodological weaknesses, particularly surrounding the validity and reliability of some of the tests conducted. I do find the results encouraging, that a combination of treatments were able to produce significant changes at 12-month follow-up. I guess the difficult decision is whether conservative therapy for a moderate hallux valgus deformity is the best long-term option.

References: J Am Podiatr Med Assoc. 2018;Apr 23 [Epub ahead of print]
Abstract

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Intra-articular injections in the treatment of symptoms from ankle arthritis: a systematic review

Authors: Vannabouathong C et al.

Summary: This review assessed the evidence for intra-articular injections including corticosteroids (CS), hyaluronic acid (HA), platelet-rich plasma (PRP) and mesenchymal stem cells (MSC) in the management of ankle arthritis pain. In 27 studies (n = 1085) in populations with ankle osteoarthritis, rheumatoid arthritis (RA), and haemophilic arthropathy, 20 case series demonstrated favourable symptomatic relief with CS, HA, PRP and MSC injections. However, the CS effect appeared to be only short-term and the evidence for MSC injections was limited to one study with six patients. A meta-analysis of pooled results from three randomised controlled trials (n = 109) suggested improved Ankle Osteoarthritis Scale scores after HA injections at 6 months (mean difference 12.47 points; 95% CI 1.18-23.77; $p = 0.03$).

Comment: The study investigated the evidence surrounding four types of intra-articular injections in the management of ankle arthritis. While the majority of the studies demonstrated favourable reductions in pain levels, no trials have directly compared CS, HA, PRP and MSC injections. It is therefore difficult to determine if one type of injection therapy is favourable. Of the injectables investigated, HA appears to be the most promising; however, there are many different HA preparations available therefore efficacy may be widely varied. The evidence surrounding CS, PRP, and MSC injections is low, with the long-term efficacy unknown. The study did not provide a working definition of ankle arthritis by severity so it is difficult to know if particular types and severities of ankle arthritis respond differently to injectables. More research is definitely required, but based on the evidence, albeit weak, injectables appear to have benefits in the management of pain associated with ankle osteoarthritis.

Reference: Foot Ankle Int. 2018;39(10): 1141-50
Abstract

Influence of diagnosis and other factors on patients' expectations of foot and ankle surgery

Authors: Cody EA et al.

Summary: This prospective cohort study examined relationships between differing diagnoses and patients' preoperative expectations of foot and ankle surgery in 278 patients undergoing elective surgery for one of seven common diagnoses. Multivariate regression analysis (adjusted for demographics and clinical characteristics) suggested that diagnosis contributed the greatest variation, accounting for 10.5% of the variation in Hospital for Special Surgery Foot & Ankle Surgery Expectations Survey scores. Patients with mid- or hind-foot arthritis ($p < 0.001$), hallux valgus ($p = 0.001$), or hallux rigidus ($p = 0.005$) had lower expectations than those with ankle instability or osteochondral lesions. Female sex ($p = 0.001$), non-Caucasian race ($p = 0.031$), and lower scores on the Foot & Ankle Outcome Score daily activities subscale ($p = 0.024$) were also associated with higher scores.

Comment: The study sought to examine patient factors that contribute to differing preoperative expectations of foot and ankle surgery. The study is very thought provoking and relevant to all clinicians as the expectations we set directly influence treatment outcomes. The study found that preoperative diagnosis played a large role in expectations. The diagnosis of mid- and hind-foot arthritis had the lowest expectations. This was attributed to the patients' recognition of the severity of their condition and a result of preoperative counselling by their surgeons regarding realistic expectations. Conversely, hallux valgus surgery was met with high preoperative expectations, such as, the ability to run for sport, improved numbness and tingling, increased variety of footwear and the expectation that the toe and joint will go back to normal. The premise of the study is that surgical outcomes may be improved through clear discussion of postoperative outcomes. I also think this holds true in the management of any condition where devices are prescribed, such as foot orthoses or bracing.

Reference: Foot Ankle Int. 2018;39(6):641-48
Abstract

Subungual exostosis and subungual osteochondromas: a description of 25 cases

Authors: Göktay F et al.

Summary: This retrospective study examined clinical, demographical and radiological features, treatment modalities, and follow-up results in patients with an uncommon, benign osteocartilaginous tumour, subungual exostosis (n = 14; 2 on the hands, 12 on the toes), and subungual osteochondroma (n = 11; all lesions on the toes). Removal of the lesion without scratching the lesion base may lead to recurrence. The nail bed is more severely damaged by disease and surgical treatment than the nail matrix. Recurrence occurred in one subungual osteochondroma patient, and two subungual exostosis patients had residual lesions.

Comment: If you regularly manage involuted nails with a subungual mass this article is worth a review. The subungual mass that you may think is just a large callus may be an exostosis. The manuscript has some nice clinical images combined with plain film x-rays that demonstrate the different presentation of subungual exostosis and the post-surgical results of exostosis removal. My advice after reviewing would be if you have any patients with long-standing involuted nails, pincer nails, or subungual growth, obtain a lateral and AP x-ray of the digit – you may be surprised what you see.

Reference: Int J Dermatol. 2018 Jul;57(7):872-81
Abstract

Squamous cell carcinoma of the nail unit

Authors: Starace M et al.

Summary: This review examined squamous cell carcinoma (SCC), a rare, slow-growing malignant tumour under the nail plate that may invade bone. Aetiology remains unknown but there is an association with high-risk human papillomavirus, trauma or radiation exposure. Different clinical presentations resembling benign or malignant nail lesions may coexist. It clinically manifests as onycholysis and erythema, and in advanced stages nail ulceration may occur. Association of pain, swelling and inflammation indicates invasive SCC with underlying bone involvement. Metastases are rare, but may involve lymph nodes. X-ray assessment to investigate bone invasion is required to determine the best surgical approach. Local excision with sufficient surgical margins is sufficient and better than amputation of the distal phalanx.

Comment: SCC is a rare neoplasm that often mimics other entities resembling benign or common infectious or inflammatory processes of the nail unit. The lack of awareness among clinicians, its painless history, and the higher frequency of benign diseases than malignant conditions that simulate SCC are factors responsible for the delay in its diagnosis. The manuscript provides a good overview of the pathogenesis, clinical manifestations (with some very good pictures), diagnostic techniques and treatment for SCCs of the nail unit. This is one manuscript I would recommend you review, as SCCs are known as the "the great mimicker nail tumour" due to the differing clinical presentations that may coexist that resemble benign lesions.

Reference: Dermatol Pract Concept. 2018;8(3):238-44
Abstract