Expert Opinion on Published Articles

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Radiographic analysis of an opening wedge osteotomy of the medial cuneiform

Michael Lutz and Mark Myerson
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This is an assessment of a large series (81 feet and 71 patients), who underwent a medial cuneiform opening wedge osteotomy to counter both a valgus deformity and forefoot abduction.

This also addressed mobile first rays.

The procedure was combined with other operations in a percentage of cases, such as calcaneal osteotomies and tendon transfers.

Arthrodesis itself was used in five cases.

A very good radiological correction was obtained post-operatively and at two-year follow-up very little correction had been lost.

The procedure was a dorsal-based opening wedge of the medial cuneiform and bone block was inserted. Towards the end of the series no internal fixation was used. This was because internal fixation in the early cases had led to a high number of removals.

The patients were weight-bearing within two to four weeks and the results are really good.

This is a large series of patients and no joint arthrodesis is performed. It gives a good result and will now become the gold standard against which any other procedure to correct a flatfoot deformity has to be judged.

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Adverse reaction to metal debris following hip surfacing
The influence of component type, orientation and volumetric wear

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The authors report on a comparative study of 4 226 hips in a follow-up of 10 to 114 months. The three implants studied were Articular Surface Replacements, the Birmingham Hip Resurfacing and the Conserve plus. This paper represents the largest collection of clinical and biochemical results of hip resurfacing patients in the current literature.

The three-centre nature of the study, the experience of the surgeons involved and the use of three resurfacing designs represent a fair representation of the performance of modern hip resurfacing in the wider orthopaedic community.

The term ARMD is introduced meaning 'Adverse Reaction to Metal Debris' as a collective term to describe the types of pathology caused by wear particles leading to failure and implant loosening and femoral neck fracture.

It includes ALVAL which is an immune-type response demonstrating lymphocytic infiltration around blood vessels as seen in histological specimens, co-existent with abundant wear particles and histiocytes.

Pseudo tumours and metallosis as well as fluid from bursae are other presenting features of this disease. Certain design features of especially the ASR implant are blamed by the authors for leading to a higher failure rate, as well as any deviations in cup positioning, inclination or ante-version.

Significant soft tissue destruction, including muscle, is also described with high doses of metal debris. The authors provide a very good graphic representation of, among others, failure rates to show the ASR 9.8% failing at 5 years compared to less than 1% at 5 years for the Conserve plus and 1.5% at 10 years for the Birmingham Hip Resurfacing.

Reviewer's opinion

We have studied the phenomenon of early failure of metal-on-metal implants, both resurfacings and stemmed prostheses, in some detail together with an implant retrieval study with Prof Danie Burger from the Department of Mechanical Engineering, University of Pretoria, and our retrieval study narrows the cause of failure down to a lubrication failure. Any number of factors like impingement or subluxation, malpositioning, design or mode of manufacture can lead to a breakdown of the lubricating film, increasing the co-efficient of friction and heating up the implant.

Spot welding and rupture-type movement then takes place in the dry bearing, with resultant abrasion wear, fretting and third body wear from particles generated. This leads to an enormous increase of metal particles leading to ARMD effects necessitating revision surgery.

The British Orthopaedic Association in their recent Torquay meeting on 2–4 March 2011 advised very careful follow-up of metal-on-metal implants and quotes much higher failure rates than have been encountered up to now.

Data from the Hip Joint Registry from England and Wales, quote 'other' metal-on-metal bearings to have a failure rate of 12–15% in five years. The ASR from DePuy is quoted as having a 21% failure rate in four years and, if all patients with pain come to revision surgery, 35% will fail in five years and 49% in six years.

This has led to a recall by DePuy/Johnson and Johnson of this implant that involves 97 000 hips worldwide, the largest recall in orthopaedic history.

Surgeons are advised to follow up their metal-on-metal patients on a regular basis. Those patients with metal-on-metal articulations receiving a stemmed femoral component turned out to be an even higher risk. As a result of this spot weld and rupture type of movement that takes place in the dry bearing, increased mobility occurs at the Morse taper joining the femoral prosthesis to the femoral head. The hard chrome cobalt head-part of the taper grinds up the softer titanium femoral taper and releases additional particles.

A worrying feature of the whole metal-on-metal failures saga is that in some cases there is a re-revision rate quoted as high as 50%.

It is also local experience by myself and colleagues that an infection in a failed metal-on-metal joint is more difficult to eradicate than in other total hips probably because of difficult removal of metal particles and a recent case took four debridement and irrigation procedures to clear up the infection satisfactorily.

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Symposium: Adult-acquired flatfoot deformity

Steven L Haddad, Mark S Myerson, Alastair Younger, Robert B Anderson, W Hodge Davis, Arthur Manoli
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There is still much controversy surrounding the management of the adult acquired flatfoot deformity (AAFD), more specifically regarding the stage II deformity (functionally torn posterior tibial tendon with a mobile flatfoot). This is an excellent article by Steven Haddad that starts with a summary of the pathology as well as the pros and cons of the different procedures. In the rest of the article, the other authors each discuss his favourite procedures and the rationale for doing those specific procedures. The procedures covered are the medial translational osteotomy of the calcaneus with an FDL transfer (Mark Myerson), medial column fusions (Alastair Younger), lateral column lengthening (Robert Anderson), arthroereisis (Hodge Davis) and the so-called 'all-American procedure' by Arthur Manoli.

Mark Myerson starts off discussing the medial translation osteotomy of the calcaneus with an FDL transfer, which is the workhorse. First he discusses a more detailed classification system than the simple 1–3 classification of Ken Johnson. He subdivides each of the stages and adds a stage 4 where the ankle is also involved. Displacing the calcaneal tuberosity medially increases the dynamic stability of the hindfoot by redirecting the pull of the Achilles tendon medially to the axis of rotation of the subtalar joint and it becomes a strong inverter and stabiliser of the hindfoot. The medial shift protects both the subtalar as well as the ankle joints in the long term. He also stresses the point that the medial translational osteotomy can already be used in stage I, combined with a tenosynovectomy of the posterior tibial tendon. The osteotomy can also be used in early stage IV deformities, combined with a triple arthrodesis, and will thus increase the contact pressure on the medial aspect of the tibio-talar joint if a valgus deformity of the ankle joint is already present. With internal fixation the tuberosity can be shifted at least 12 mm. He provides a good description of alternative fixation methods of the osteotomy and also post-operative care.

Alastair Younger then discusses medial column fusions. He stresses the point that the patient with the symptomatic adult flatfoot will have a combination of hindfoot valgus, external rotation of the forefoot in the transverse plane and forefoot varus of the hindfoot.

Forefoot varus on the hindfoot can be assessed by bringing the hindfoot to neutral and looking at the position of the forefoot with respect to the long axis of the tibia. A lateral column lengthening will correct the forefoot external rotation and hindfoot valgus. Correction of the hindfoot and forefoot in the transverse plane will increase the forefoot varus, which might lead to a poor outcome. Doing an opening wedge osteotomy of the medial cuneiform (Cotton), or first ray osteotomies will correct only the first ray and he feels strongly that complete correction of the medial column is best achieved by a naviculo-cuneiform fusion. This is frequently the point of collapse of the medial column on standing radiographs. He starts off by doing a lateral column lengthening to bring the forefoot into a neutral position in the transverse plane. The forefoot varus is then assessed. If it is more than 10° to 15° a naviculo-cuneiform fusion is needed. He uses mainly screw fixation and the technical details are described.

Robert Anderson discusses lateral column lengthening. He describes the importance of the sub-classification of stage II deformities into A and B, sub-typed according to the amount of navicular coverage that exists around the head of the talus, with A less than 50% of the talar head being uncovered by the navicular and B where more than 50% of the head is exposed. They further add type C based on the presence of forefoot varus. Their standard procedure for the AAFD is a medial translation calcaneal osteotomy with FDL tendon transfer but a lateral column lengthening is reserved for the type B cases where there is still residual uncovering of the talar head after the medial translational calcaneal osteotomy. He also gives a historical perspective on the treatment of AAFD and stresses the point that a tendon transfer as an isolated procedure was ineffective, and that bony osteotomies were thus introduced to supplement the soft tissue procedures to help maintain long-term correction. In the presence of arthritis of the calcaneo-cuboid joint a lengthening should be performed through the joint, otherwise through the distal calcaneus typically 1.5 cm proximal to the joint itself. A gastrocnemius recession is usually also included. Uncertainty still surrounds how the lateral column lengthening works and he discusses the different theories. They sometimes add a peroneus brevis to longus transfer which might provide more power to the peroneus longus, thus increasing the

plantar flexion advantage of the first ray, but it might also aid the mechanical advantage of the somewhat weak FDL tendon transfer.

Hodge Davis then describes the role of arthroereisis in the adult. It is important to remember that this implant is at best an adjunct and does not replace the need for traditional osteotomies and tendon transfers. He uses it in very select cases of grade I or grade II AAFD and always combines it with more traditional osteotomies and tendon transfers. His indications are: a grade II flatfoot with lateral sinus tarsi pain and a valgus knee; an asymmetric flatfoot with spring ligament repair, with displacement osteotomy that might need some more support; and finally a flatfoot with an accessory navicular requiring an advancement of the posterior tibialis muscle as well as an osteotomy of the calcaneus where the arthroereisis is added to protect the medial repair. It is important to remember that in a large percentage of adults there is persistent pain after an arthroereisis and that a large percentage of the prostheses need to be removed at a later stage.

Arthur Manoli describes the 'all-American procedure' which is an amalgamation of a number of paediatric procedures used for flatfoot in children. The procedure is actually a combination of all the above-mentioned procedures including excision of the posterior tibial tendon, FDL transfer, heel chord lengthening, distal calcaneal lengthening osteotomy combined with a medial displacement osteotomy and then occasionally distal procedures like an open wedge first metatarsal osteotomy. He also mentions that a tenotomy of peroneus brevis may be done if it is excessively tight or a peroneus brevis to longus transfer.

The main message of this excellent article is that each foot should be evaluated individually, and that one should not focus on just one specific procedure. Both the clinical evaluation and standing X-ray views and the different deformities that have developed are important and should all be identified and addressed during surgery.

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Calcaneal lengthening for valgus deformity of the hindfoot

VS Mosca
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The treatment of the severe, symptomatic valgus foot in children has evolved from medial soft tissue procedures to subtalar extra-articular arthrodesis (Grice procedure) to calcaneal osteotomy (medial displacement or opening wedge) to calcaneal lengthening. Calcaneal lengthening should probably currently be the treatment of choice as it does not affect the mobility of the foot and is supported by a study demonstrating the best long-term results of any procedure used to correct valgus feet.[1]

The author gives a good and comprehensive overview of the surgical treatment of severe, symptomatic valgus feet. The clinical and radiological features pre- and post-operatively should be utilised in the routine assessment of any valgus foot. The assessment and management of additional problems (equinus, skew foot, external rotation of the tibia and ankle valgus) are stressed.

The technique is a modification of the calcaneal lengthening procedure described by Evans[2] who postulated that in club foot the lateral border was too long (relative to the medial column) and shortened it with a calcaneocuboid fusion. In the valgus foot the opposite applies; the short lateral column requires lengthening.

The majority (24 of 31 feet) were neuromuscular, i.e. cerebral palsy and myelomeningocoele. The procedure can also be used in the overcorrected club foot and rarely in the older patient with persistent, severe flexible flatfoot, and Evans even used the procedure in the idiopathic peroneal spastic flatfoot (without coalition). The overall results were satisfactory, with preservation of subtalar motion, in all but two of the most severely deformed feet.

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Operative versus nonoperative treatment of acute Achilles tendon ruptures A multicenter randomized trial using accelerated functional rehabilitation

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The choice between operative versus non-operative treatment of acute Achilles tendon ruptures remains controversial.

Although the majority of studies support the operative route, this prospective randomised study highlights and favours the non-operative, accelerated functional rehabilitation treatment.

The article begins with a short historical background. Of interest are the published studies of animals and humans that demonstrate spontaneous healing of tendons without immobilisation and the benefit of functional stimulus to healing tendons. Furthermore, early weight-bearing with protected range of motion has shown favourable outcomes in studies specific to the Achilles tendon. The purpose of this study was to compare the outcomes of the surgically repaired acute Achilles tendon ruptures and accelerated functional rehabilitation with the outcomes of similar patients who had been treated with accelerated functional rehabilitations alone.

The primary outcome that was assessed was the re-rupture rate and the secondary outcomes included isokinetic strength, Leppilahti score (a score of 100 is a disease-specific functional outcome measure that includes patient ratings of pain, stiffness, calf muscle weakness, footwear restrictions, range of motion and satisfaction as well as objective measures of strength), range of motion and calf circumference measured at 3, 6, 12 and 24 months after injury.

The study included 144 patients (118 male and 26 female, mean age 40.4 years) between 2000 and 2005, in two Canadian centres. Randomisation was computer-generated.

The operative treatment was essentially routine except for the use of non-absorbable suture which is in itself debatable for its use in a primary acute repair.

Meticulous closure of the skin was emphasised. The accelerated functional programme began at 2 weeks.

It permitted protected weight-bearing at 2 weeks that progressed to weight-bearing as tolerated at 4 weeks. Patients wore a functional boot for 8 weeks.

The results were statistically analysed.

Re-rupture occurred in two patients in the operative group at 1 and 3 months and in three patients in the non-operative group at 1, 2 and 3 months after injury.

Of interest is that four of the five patients who experienced a re-rupture were treated with surgical repair, and one was treated non-operatively at her own request.

Most of the other complications pertained to the surgery (9 of 72, of which one was a deep infection).

Of note is the deep vein thrombosis and pulmonary embolus (total of three patients). Although the number is small, the question of prophylactic anticoagulation in foot and ankle surgery needs to be addressed. Was a risk assessment carried out prior to the surgery? Were high risk patients given prophylaxis? One pulmonary embolus leading to death is one too many!

Generally, no clinically important differences were found between operative and non-operative treatment for any of the measured parameters. The study was well conducted but on the authors' admission, it was too small a sample size to provide definitive conclusions about re-rupture rates.

The accelerated functional rehabilitation could have been discussed in more depth as this was a major contributor to both operative and non-operative treatment.

Nevertheless, the authors surmise that early weight-bearing and mobilisation may have resulted in a substantially reduced rate of re-rupture (~ 4.6%) as compared to other studies in which patients were treated conservatively (13%).

This study has found all measured outcomes to be clinically similar between the two groups with the non-operative group avoiding serious complications related to surgical management.