high amounts. We are delighted to see this paper describing an effort to prevent and minimise the peri-operative risk of infection. These implants appear to be safe without compromising patient function and may become increasingly relevant. The key to establishing their safety is to carefully introduce new technology backed up by appropriate animal safety studies. Orthopaedic surgeons are all too familiar with the ongoing issues associated with metal-on-metal reactions and accumulated metal debris. Silver has a long track record of safe use in humans (in applications as diverse as the silver Negus tracheostomy tubes), however, clearly any new metallurgy involved in an articulating surface should be evacuated very carefully, given recent history.

High rates of failure with modular neck designs

■ Increased modularity adds the attractive option of a more 'anatomical' fit for many implants, with the advantage of increased restoration of normal anatomy and therefore function. However, there are some potential disadvantages to this approach and, with the phenomenon of trunnionosis already a problem, adding further junctional tapers (often with oblique loading) has the potential to worsen the situation. Some early clinical reports have suggested high failure rates from these implants. Researchers from **Houston, Texas (USA)** have set out to establish the potential problems with these systems, and have gone back to review their own modular total hip arthroplasty (THA) experience with 73 arthroplasties.[8] The headline figures are that at a mean follow-up of 4.2 years after THA performed with a specific modular-neck femoral stem (Rejuvenate; Stryker, Kalamazoo, Michigan), the authors demonstrated an 86% clinical failure rate with 78% of the stems having undergone revision. A truly shocking outcome. The authors assign this to a corrosion-related failure rate. It is clear that continued close monitoring of this stem design is prudent and early revision after identification of stem failure is recommended. It does beg the question: how in the modern era can implants that have such a high failure rate be permitted for public release?

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Knee

X-ref ***For other Roundups in this issue that cross-reference with Knee see:*** *Hip & Pelvis Roundup 2; Children's orthopaedics Roundups 1 & 7; Research Roundups 1, 2 & 5.*

Closure with barbed sutures?

■ There is plenty of evidence from primary studies through to randomised controlled trials and meta-analyses that suture closure reduces the infection rate following orthopaedic surgery. Anecdotally, patients prefer the look of a hand-sewn closure to the rather ugly scars left by clips. Surgeons, however, quite like the convenience and consistency provided by clips, and as such they have continued to be popular. Barbed sutures offer the neat scar and subcutaneous position of a suture, but as they do not rely on knots these sutures also provide the convenience of clips. They are increasingly being used in total joint arthroplasty, but in contrast to traditional sutures and clips, few studies have been conducted on their use, and in particular their infection rates. Surgeons in **New York, New York (USA)** have been using barbed sutures for closure in their unicompartmental knee arthroplasties (UKA) and report the outcomes of 839 unicompartmental knees closed with either the Quill barbed suture (Surgical Specialties Corporation; Wyomissing, Pennsylvania), or traditional closure consisting of a mixture of 2/0 monocryl and clips.[1] The study cohort consisted of 333 Quill closures and 506 conventional closures. Outcome measures included wound infections. Slightly surprisingly, all eight wound infections occurred in the Quill cohort. Given the low event rate and small numbers, it is possible to ignore these findings. Nonetheless, this is the best evidence there is at present, and it indicates significantly higher superficial infection rates with the Quill suture. Not unreasonably, the authors recommend against the use of barbed sutures in the subcuticular closure of UKAs.

Minimally invasive knee arthroplasty at five years

■ Surgeons and patients alike love the thought of minimally invasive or keyhole surgery, and with less soft-tissue disruption, reduced scarring and soft-tissue pain, from a surgical perspective the results seem likely to be preferable. We have never been huge fans here at 360, as the results of arthroplasty are to a certain extent determined by the accuracy of implantation, meticulous attention to surgical technique and the delicate task of getting the thing in straight, all of which are more difficult with a 'mini' approach. This, combined with the general lack of good-quality evidence to support the use of minimally invasive hip or knee arthroplasty, has caused us to stay away. However, we were delighted to see the five-year results of a study from **Rotterdam (The Netherlands)**, designed to evaluate the benefit (or otherwise) of minimally invasive midvastus and conventional total knee arthroplasty (TKA).[2] The authors report their randomised controlled trial of 100 TKAs (97 patients) randomised to either midvastus or conventional surgery. The primary outcome measure was the clinical patient-reported outcome measure (PROM), with the knee injury and osteoarthritis outcome score (KOOS), Oxford knee score (OKS), Knee Society score (KSS) and short form (SF-12) reported. In addition, the usual gamut of secondary outcome measures including and skin incision length were reported. This long-term five-year study essentially demonstrated no clinical outcome differences between the two

groups based on multiple assessment scores. Overall, alignment was similar, although the posterior slope was greater with the mini-midvastus approach. Finally, there were more complications in larger males using the mini-midvastus approach, thus encouraging surgeons to use the conventional TKA approach in all patients. It seems that this study yields some good answers about the longer-term outcomes of midvastus total knees. The clinical outcomes appear comparable; however, there is a marginally higher complication rate and the implants are not as accurately placed, with the benefit being on average a 2 cm shorter incision.

KOOS-JR for knee arthroplasty

In the second of a pair of papers reporting the development of joint-specific scores for reporting total knee and hip arthroplasty outcomes, the study team from **New York, New York (USA)** have followed a very similar approach with the knee injury and osteoarthritis outcome score (KOOS) as they did with the hip disability and osteoarthritis (HOOS) outcome score.[3] While each of the myriad existing scores has its own exponents and its own benefits, the advantage of the new score is that not only is it properly constructed and validated, but the authors have also managed to reduce the sense of the KOOS score into just seven questions. The KOOS-JR was found to have high internal consistency and may become the standard of outcome testing for total knee arthroplasty in the future.

Metal allergy and arthroplasty

In the fast-moving, connected society in which we live, patients are being given more and more (often slightly unusual) information – all available 24/7 and at their fingertips. We wonder if the rise in patients concerned about the possibility of metal allergy affecting the outcomes of total knee arthroplasties may be due to an increasingly connected, neurotic few; after all, these have been in use for decades and there never used to be a problem. The alternative explanation of course is that there is in fact a problem. Orthopaedic surgeons are finding that having conversations with patients about a possible allergy to certain metals potentially precludes the patient from a standard 'off the shelf' joint arthroplasty. Some have reported up to 48% of the population having some form of metal allergy, most commonly nickel. The team in **Exeter (UK)** have produced an incredibly useful review of where the latest scientific evidence is at present.[4] The authors highlight that there is some confusion about the issues around metal-on-metal (MoM) bearings and an allergy to certain metals that form part of a joint arthroplasty. Some joint registries (such as the Australian Orthopaedic Association National Joint Replacement Registry) have reported metal hypersensitivity to be the fifth most common cause for revision, contributing to 5.9% of revisions. However, since these registry data were published in 2012, the wording has been changed to 'metal-related pathology'. With the new classification, the number of revisions associated with metal-related pathology has dropped to 0.5%, as reported in 2014. Even classifying what is meant by 'sensitivity to metal' is somewhat controversial. To date, there do not appear to be any studies to suggest that a hypersensitivity to metals is responsible for aseptic loosening. One very interesting observation was from a comparison between the joint registry data in Denmark and the Danish patch registry data. There was no association between metal allergy and total hip arthroplasty (THA) in patients linked by the two registries. However, these data could not be extrapolated to total knee arthroplasty (TKA) as only 0.5% of the THA population of over 70 000 had a positive patch test, which is well below what would be expected in the general population. This brings into question the accuracy of the patch registry data, and therefore whether any meaningful conclusions can be drawn from it. Despite the confusing amount of evidence in the literature, there is considerable support to use standard implants in patients who have a proven metal hypersensitivity. However, this hasn't stopped implant companies developing 'hypoallergenic' components. In TKA, some will elect to use a hypoallergenic femoral component with an all-polyethylene tibial component. While the authors accept that hypersensitivity to metal exists, the real problem, they suggest, is metal wear debris similar to polyethylene debris causing an immunological response, resulting in aseptic loosening. Therefore, they conclude that at present there is not sufficient evidence to support the use of unproven hypoallergenic components. They suggest that it is in the patient's best interest to continue using standard implants with a proven track record. Nonetheless, we still face being questioned by patients about the materials used in their implants, and if the outcome following their joint arthroplasty is below their expectations they will believe that this is due to a pre-existing hypersensitivity.

What's wrong with 'all-poly'?

There are some significant (theoretical at least) advantages to the all-polyethylene tibia. The elimination of the interface on the 'backside' of the polyethylene theoretically reduces the incidence of backside wear. Perhaps more crucially, since there is no modulus mismatch, there is no possibility of subsurface stress concentrations and macroscopic failure. Detractors argue that the all-polyethylene design doesn't allow for flexibility when implanting or the exchange of polyethylene, and that the tibial component may subside or crack. In their review of over 31 900 primary total knee arthroplasties (TKAs) performed over a 43-year period, these authors from **Rochester, Minnesota (USA)** set out to establish what exactly the outcomes were of their own mixed series of patients with all-polyethylene and metal-backed tibial components.[5] Outcomes were assessed in terms of revision-free survival and, perhaps surprisingly, the all-tibial components were the out-and-out winners. The all-polyethylene design demonstrated an improved five-, ten-, 20- and 30-year survivorship compared with the metal-backed designs. In addition, the all-polyethylene design was superior in terms of secondary outcomes including reduced rates of post-operative infection, fracture, and tibial component loosening regardless of age or BMI. This paper will, we are sure, pour fuel on the fire of the ongoing debate: modular or not, metal-backed or not. It is worth bearing in mind that this is a series with significant long-term follow-up, lending credibility to the results, but by definition this also means that the implants reported do not feature the latest tribology or design features. As it stands currently based on this result, the future looks rather bright for an all-polyethylene tibia.

Overthinking the anterior cruciate ligament?

Anterior cruciate ligament (ACL) reconstruction surgery has been the focus of a large number of randomised controlled trials and other studies. With concerns about single-*versus* double-bundle, anatomic *versus* traditional tunnel placement and hamstrings *versus* patellar tendon all having their own fair share of debate, many journal pages have been devoted to the ins and outs of the best option. One probably quite important factor that has been a little neglected is how tight to tension the graft. There are a fair few basic science studies evaluating the effect of pre-tensioning and the best types of sutures and insertion techniques; however, there are few clinical studies, and even fewer randomised studies informing practice. This is perhaps one of the key questions to ask. If the surgeon fundamentally accepts that it is not possible to reconstruct entirely anatomically, then there is an interaction between the need to provide stability and the risk that overtightening will result in abnormal joint biomechanics and increased loading,

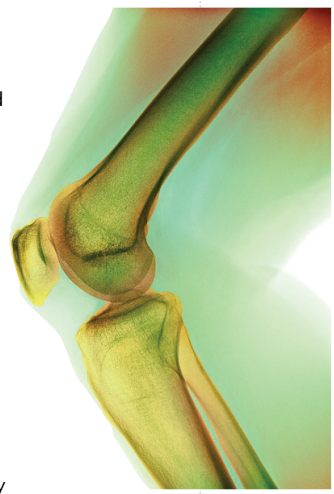
and therefore potentially hastening the onset of secondary arthritis. There is precious little to inform the decision about 'tightness' of the joint. We were delighted here at *360* to read the results of this randomised controlled trial from **Providence, Rhode Island (USA)**. These investigators report a study of ACL reconstructions either deliberately performed tightly with 2 mm of over-constraint compared with the contralateral side, or a 'normal' group aimed at reconstruction to anatomical laxity.[6] The outcomes were assessed at 84 months following reconstruction, with osteoarthritis development the primary outcome measure. The usual gamut of knee outcome scores was also reported. In addition, the authors report a well-matched control cohort with uninjured knees. Essentially, the overall outcome of this study is that it doesn't matter. Even at longer follow-ups there is no difference in either clinical outcomes or osteoarthritis development between these cohorts. We can't help but wonder if there is some significant 'over-cerebrating' going on with the ACL. The graft appears to treat the symptoms of instability without really making a difference in the longer term to any other outcomes. The message here is that it doesn't seem to matter how much the graft is tensioned prior to insertion.

Revision anterior cruciate ligament reconstruction: who does well?

■ Revision anterior cruciate ligament (ACL) reconstruction is a difficult operation to undertake, and it is even more difficult to establish who is likely to do well following revision surgery. Patients presenting who need ACL revision often have complex intra-articular pathology, and it is usually far from clear what exactly is symptomatic - the meniscal tear, the instability, or the countless other pathologies (such as osteochondral defects) that can co-exist. The MARS group in **Nashville, Tennessee (USA)** has published its cohort study with the intention of shedding some light on who will do well and who will do poorly from revision ACL reconstruction.[7] Despite the rare nature of this diagnosis, the study team was able to report the results of an impressive 1205 patients, all of whom underwent revision ACL reconstruction at the hands of 83 surgeons in 52 centres over the six-year period of the study. Outcome measures including the International Knee Documentation Committee (IKDC) subjective knee evaluation, knee injury and osteoarthritis outcome score (KOOS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and the Marx activity score were documented by the group. They report the outcomes at a minimum of two years of follow-up, and attempted to relate pathology seen at revision surgery with eventual outcome. The take home message is that the main risk factors for a poor outcome are a previous lateral meniscectomy and patellofemoral joint arthritis. The clinical outcomes were not dictated by the presence of meniscal or cartilage pathology at the time of revision surgery — an important message for surgeons contemplating management of these complex patients.

Liposomal bupivacaine is of no advantage in anterior cruciate ligament reconstruction

■ Post-operative analgesia is a key factor in patient satisfaction, and many studies have shown all sorts of potential advantages including improved post-operative outcomes and return to work in a variety of surgical interventions, both within and outside orthopaedic surgery. In the quest for improving post-operative outcomes, likelihood of same-day discharge and short-term ability to comply with physiotherapy, there have been a variety of studies (randomised and otherwise) in recent years exploring post-operative analgesia following anterior cruciate ligament (ACL) reconstruction. These investigated, among other things, intra-articular morphine, lignocaine and bupivacaine. The authors of this study looked at the preparation of bupivacaine which has been shown in other studies to be among the most effective agents in post-operative analgesia. The study team designed a randomised controlled study investigating liposomal *versus* standard bupivacaine in a double-blinded randomised controlled trial. All 32 patients in this study from **Atlanta, Georgia (USA)** underwent quadriceps tendon autograft for the ACL reconstruction and patients were then randomised to intra-articular bupivacaine or liposomal bupivacaine.[8] Outcomes were assessed in terms of post-operative pain scores, 'top-up analgesia' and recovery. This was an incredibly small study and we can only think it was designed as a pilot study, though it is reported as a definitive trial. The effect size that would be required between the two preparations to yield a significant difference with just 16 patients in each arm would be enormous. Nonetheless, the authors did not find any differences between the two groups, although the authors comment that there was a 200-fold increase in cost in the liposomal bupivacaine. We are presuming, given the tone of the paper, that the authors are not planning a definitive study after this small pilot work; however, we do feel strongly here at *360* that this should be reported as a pilot study – after all, it quite clearly can't be anything else.



Another nail in the arthroscopic knee surgical coffin?

■ In these days of evidence-based medicine, one of the trickier situations orthopaedic surgeons face is a consistently failing treatment. We have yet to see a randomised controlled trial evaluating arthroscopic meniscal surgery (or anterior cruciate ligament surgery, for that matter) which demonstrates any kind of improvement over conservative treatment with review and physiotherapy. In what is the biggest publication in knee surgery over the past few months, researchers in **Oslo (Norway)** have reported their randomised study of the outcomes of 140 adults with degenerative meniscal tears, managed with either arthroscopic debridement or physiotherapy.[9] All patients were 'middle-aged', which for the purposes of this study they defined as between 35 and 60 years, and all had an isolated injury. Participants were randomised to either a 12-week course of physiotherapy or arthroscopic partial meniscectomy. This randomised controlled trial evidence suggests, in short, that arthroscopic meniscectomy is ineffective in treating meniscal tears. It is a well-designed trial in which knee surgeons will almost certainly pick holes (again). The key message of this paper is that the majority of patients had no arthritis, and the knee injury and osteoarthritis scores at three, 12 and 24 months were no different. The authors also demonstrate in supplementary data that although 20% of patients crossed over from physiotherapy to surgery, these patients did not significantly improve after arthroscopy, although admittedly these data are difficult to interpret. Compliance with the exercise protocol was reasonable but quite a number were not able to do the exercises or refused to participate. In some healthcare systems, it is starting to get to the stage where if there is no compelling evidence to support arthroscopic meniscal surgery,

healthcare funders will soon suggest that knee surgeons hang up their arthroscopes. After all, physiotherapy is a lot cheaper – even at 12 sessions.

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Foot & Ankle

X-ref ***For other Roundups in this issue that cross-reference with Foot & Ankle see:*** *Research Roundup 1.*

Cuboid fractures revisited

■ Though infrequent, a fracture of the cuboid is a potentially devastating injury. The loss of the integrity of the lateral column can lead to significant disruption of the midfoot and its function, and in some cases consequent forefoot deformity due to the altered midfoot. Authors from **Sheffield (UK)** undertook an extensive review of their own series of patients, all with cuboid fractures.[1] The study team identified their patients based on radiographic reports and were able to review 192 such fractures. Their study focussed on the patterns of injury and subsequent management, rather than outcomes *per se*. The authors reviewed the records and radiograph reports such that they were able to sub-classify the fractures into five different patterns. The most common were simple avulsion fractures of the capsule of the calcaneocuboid joint — often reported by radiologists but managed conservatively in practice — which constituted nearly 50% of these injuries. Isolated extra- and intra-articular injuries confined to the cuboid constituted a further 20% of cases, with the remainder involving disruption of the midfoot and tarsometatarsal fractures (18.2%), and the final group including a column injury to either the lateral or to both columns (13.5%). The authors present a fairly rudimentary management strategy that is hardly controversial. They describe a mixture of open reduction and internal fixation for the isolated cuboid injuries, and bridging fixation for the column injuries. Significant midfoot injuries including cuboid fractures are complex injuries that require difficult decision-making. This paper serves to helpfully classify the injuries, with the authors making the division between a column injury, cuboid fracture and avulsion. It would be helpful to know what the implications of these different types of injury are on the eventual outcomes, and the success of various interventions.

Cast *versus* symptomatic treatment for base of fifth metatarsal fractures

■ Fractures of the fifth metatarsal base are commonly presented injuries to the emergency department and orthopaedic clinic. Treatment strategies differ widely between surgeons and may include cast immobilisation, walker boots, stiff-soled shoes and compression support bandages. In some cases, when the fracture is widely displaced or in cases of nonunion, operative intervention may be contemplated. In a randomised controlled trial from a team in **Sheffield (UK)**, patients with a fifth metatarsal avulsion fracture (Lawrence and Botte type 1) were recruited into the study comparing the lightweight, below-knee walking cast with the double elasticated bandage worn under normal footwear (symptomatic treatment).[2] Unusually, this study was powered for non-inferiority – perhaps to the cynical among us this suggests that the authors had a preconceived idea about which outcome they would prefer to see as positive. Despite the issues with correct decision-making, great variations in clinical practice and the relatively common nature of the injury, there is little in the way of evidence to support one treatment over the other. The 60 patients enrolled in the study were randomised to either a lower limb plaster or double tubigrip and the patient's usual shoes. Both groups underwent treatment for four weeks. Outcomes were assessed using the visual analogue scale - foot and ankle (VAS-FA) and a patient-reported outcome measure (PROM); assessments were made at presentation and subsequently at four weeks, three months and six months post-injury. Blinded data analysis was undertaken; however the loss to follow-up was significant with a rate of 43% at six months and, as such, the analysis revolves around the results of just 26 patients. The investigators concluded that cast immobilisation of these fractures provided no benefit over symptomatic treatment during the follow-up period. We would, however, inject several notes of caution to this. The study was set up as a non-inferiority study and, as such, only non-inferiority has been demonstrated. Given the final follow-up numbers, it may be that even non-inferiority has not been established.

Metatarsal transfer lesions after distal chevron osteotomy for hallux valgus correction

■ Transfer lesions at the lesser metatarsal heads are a recognised complication of hallux valgus surgery. One of the neatest explanations as to what might be causing them is that shortening leads to increased plantar pressure and pain over the heads of the lesser metatarsals. Without doubt, metatarsal shortening is a contributing factor, but other factors such as dorsal displacement and the potential for rotation introduced by some osteotomies can also contribute. Preservation of first metatarsal length during metatarsal osteotomy is considered an important part of the surgical technique; however, only a scarf osteotomy truly preserves the metatarsal length. In a study of 185 feet undergoing a first metatarsal distal chevron osteotomy, a team from **Gyeonggi-do (South Korea)** investigated the occurrence of second metatarsal transfer lesions in their large post-operative cohort of patients.[3] The study team defined a transfer lesion as metatarsalgia, a painful callosity, or a painless callosity which developed post-operatively. The incidence rate of transfer lesions using their technique at a mean follow-up of 28 months was found to be only 2.7% (five feet). The authors went on to examine the relationship between the presence of transfer metatarsalgia and any metatarsal shortening. While the authors do accept that measuring metatarsal