sensitivity and a specificity of 95.5%. These results demonstrate impressive accuracy of reduction as judged by the inlet view which, in this series, is as accurate as CT scanning. This is a much more important finding than first appears as, given the current trends towards on-table CT scanning in complex operative interventions, it raises questions about radiation exposure in paediatric patients who are incredibly sensitive to radiation.

Open tibial fractures in children

The changes that have happened in the UK trauma system have centralised the management of badly injured patients, adults and children alike. While this has resulted in great progress in the management and care of these patients, the scientific publications are only just starting to follow. In the adult trauma world, the management of open tibial fractures is a much studied area, in part due to the severity of the injury and in part due to the problems we face when it all goes wrong. Although there has been a great deal of work done on the treatment of adult patients and optimising their outcomes, there has been little progress (or little apparent progress in the literature) in children's open tibial fractures, largely due to the rarity of the injury. Surgeons in the Major Trauma Centre in **Birmingham (UK)** have shared their experience with open tibial fractures in children, and it's a paper that really is worth reading.[7] Their study concerns the management of 61 children treated between 2007 and 2015 with a mean age of nine years. In contrast to what we might expect, just eight involved the physis, the majority arrived 'out of hours', and two thirds were due to motor vehicle collisions. The cohort had a range of different immediate stabilisation options, including casting (15%), elastic nailing (31%), K-wiring (21%), and a single case of intramedullary nailing. From the soft-tissue perspective, wound closure was primary in 39%, delayed primary closure in 18%, split skin graft in 13%, local flap in 28% with a single free flap. The overwhelming majority (70%) were high-energy injuries and this resulted in three deep infections. No patient in this study who underwent primary wound closure developed an infection which would clearly be at somewhat odds to the results seen in the adult population where primary closure in high energy fractures is associated with significant infection rates. There are some valuable lessons to be seen here, and we applaud the authors for publishing a large series highlighting the difference between the management of adult and paediatric open tibial fractures.

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Research

X-ref ***For other Roundups in this issue that cross-reference with Research see: Hip Roundup 3; Knee Roundup 1; Foot & Ankle Roundup 5, Spine Roundups 1 and 7; Trauma Roundups 1 and 8; Oncology Roundup 2.***

Genetic factors contribute more to hip than knee osteoarthritis X-ref

As the age of the genome is progressing, we are starting to see the publication of large cohorts which rely on genome sequencing. These cohorts usually utilise genome-wide association studies (GWAS) where the entire genome is sequenced in a number of individuals and genetic associations are made that may or may not be associated with a specific phenotype. However, before the age of the nucleotide and rapid and cheap gene sequencing, it was possible to undertake similar studies using twins – after all, the only way you can really unpick the nature *versus* nurture issue is to undertake twin and sibling studies. It transpires that there is still a lot you can figure out from these kinds of studies, and researchers in **Oslo (Norway)** undertook an interesting association study using a combination of twin data and the Norwegian Arthroplasty Registry.[1] This study involved linking data from the Norwegian Arthroplasty Registry and the Norwegian Twin Registry, resulting in a population cohort study of all same-sex twins born between 1915 and 1960. There were 9058 pairs of twins (18 116 individuals) reported in this study, of which 3803 were identical (monozygotic) twins and 5226 were non-identical (dizygotic) twins. The study spanned the life of the outcome registry (27 years for hips, 20 years for knees). Using this methodology, the research team were able to explain rather elegantly the contribution of genetic and environmental factors to the incidence of hip and knee arthroplasty. It appears from their results that these are somewhat different. In total, 73% (95% CI 66% to 78%) and 45% (95% CI 30% to 58%) of the observed variation in hip and knee arthroplasty rates could be explained by heritable factors. The authors also recorded other factors such as sex, body mass index (BMI) and education level. When the authors adjusted for potential confounders, there was a huge difference in observed association between genetic factors and incidence of primary arthroplasty. With regard to the hip, the hazard ratio was 2.98, but it was much lower in the knee, at 1.15. This difference was chiefly explained by a more significant effect of BMI on knee arthroplasty rates. This is a fascinating article and underlines the profound effect that BMI has on a range of conditions; here, it appears more important than genetics.

Metal hypersensitivity the cause of unexplained post arthroplasty pain? X-ref

There is an ongoing debate, which is increasingly difficult to follow, surrounding metal allergy and its implications for arthroplasty. As the common cause of metal sensitivity is immunoglobin E (IgE)-mediated histamine release and specifically is a contact dermatitis, there has historically been some scepticism surrounding the reports of metal allergy affecting outcomes following joint arthroplasty.[2]

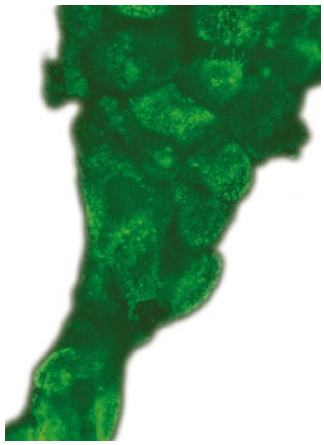
However, recent work has shown that metal ions are a problem following joint arthroplasty, even where a metal-on-metal articulation isn't used, and we have known for over 20 years that serum IgE can be produced in unusual manners and can even be associated with asthma as a response to both nickel and chromium. Given the potential for systemic IgE response to metal, and mediation of remote site responses, there is the potential for metal allergy (or rather, hypersensitivity) to play a role in the outcomes of joint arthroplasties. Researchers in **Chicago, Illinois (USA)** set out to investigate whether unexplained joint pain following total joint arthroplasty could be accounted for by a hypersensitivity response.[3] Although not a perfect study, the research set out to explore the underlying mechanisms responsible for previously identified sex discrepancies in implant failure, and, specifically, whether hypersensitivity responses have a bearing. The authors describe a retrospective study of over 2500 joint arthroplasties, all with subsequent unexplained pain. The patients were all referred for *in vitro* metal sensitivity testing. The authors report that there are some significant differences in the presentation between patients with higher lymphocyte stimulation indices in males than females (mean 5.4 *vs* 8.2). Following painful joint arthroplasty, 49% of females had a reactive lymphocyte stimulation index (> = 4) compared with just 38% in males. In this select group of patients, all with painful joint arthroplasties, there does seem to be a very high activation of lymphocytes which is predominantly seen in women. The difficulties in setting this in context is that there is no comparison group without painful joint arthroplasties, so all we can really say is that in these patients who have painful joint arthroplasties this is the lymphocyte activation that is observed, however, we do not know whether that is raised or not.

The bacteria not the treatment? X-ref

Periprosthetic joint arthroplasty remains one of the most morbid conditions in trauma and orthopaedics due to the potential combination of repeated surgery, scarring, risk of chronic infection and compromised functional outcomes, not to mention limb loss in extreme cases. These complications occasionally leave us with a significant problem, the sequelae of which are all too familiar to most surgeons. Although there has been much focus on treatment of infected periprosthetic joint arthroplasties, there has been little in the literature about the effect that the individual bacterium has on outcomes. This is rather surprising, given the massive range of different species, each with their own individual characteristics. These authors, from **Durham, North Carolina (USA)** reviewed the records of patients undergoing revision joint arthroplasty in their centre over a ten-year period, and analysed them by infecting organism rather than by surgical treatment.[4] In addition to the particular organism, a veritable feast of other data were collected including surgical details, indications, patient demographics, baseline characteristics and eventual outcomes. Interestingly (although this will not be a surprise to anyone who treats orthopaedic infections, periprosthetic or otherwise), the type of infection had a profound effect on the treatment required. There were significantly poorer cure rates for patients who developed infections with *Pseudomonas*, methicillin-resistant *Staphylococcus aureus* (MRSA), and *Proteus*. Additional surgical interventions (on average between 1.1 and 2.6 per patient) were required with patients who developed infections with methicillin-sensitive *Staphylococcus aureus* (MSSA), coagulase-negative *Staphylococcus*, MRSA, *Pseudomonas, Peptostreptococcus, Klebsiella, Candida*, diphtheroids, *Propionibacterium acnes*, and *Proteus* species. There was some overlap in the infections associated with above-average hospital stay (mean 8.56 to 24.54 additional days), with infection with MSSA, coagulase-negative *Staphylococcus, Proteus*, MRSA, *Enterococcus, Pseudomonas, Klebsiella*, beta-haemolytic *Streptococcus*, and diphtheroids all incurring a longer stay in hospital. The significant missing piece in the arthroplasty revision jigsaw is tailoring surgical intervention to the bacterial species present. This paper nicely identifies those organisms where patients are at a higher risk of multiple procedures, longer lengths of stay, and poor cure rates. It seems that surgeons ought not to be questioning whether patients should have a single- or two-stage revision, but rather how aggressive they need to be to clear the bacterium, and which of the strategies they should pursue.

Could broccoli be the saviour of osteoarthritis?

The 'magic bullet' for osteoarthritis is as elusive as the holy grail. Health food shops will sell you everything from vitamin D and chondroitin to tomato extracts and garlic to treat osteoarthritis. However, none of these substances has been demonstrated to have any efficacy in randomised controlled trials for slowing the progression of osteoarthritis. One day we all hope to be out of a job – when the disease takes hold, we want to be able simply to prescribe a tablet to rebuild the cartilage scaffold. However, based on current research, this prospect is so far off that we don't think arthroplasty surgeons should be looking for new employment just yet. The two major bars to medical treatment of osteoarthritis have always been catching it early enough (even a treatment that slows cartilage loss verifiably would need to be started many years before patients typically present to their family doctor) and getting an oral agent in sufficient quantities into



the somewhat privileged site of the intra-articular space. An interesting, if brief, report from **Norwich (UK)** looked at the potential for dietary isothiocyanate (which is found in broccoli) to penetrate the joint tissue.[5] The group had previously demonstrated that sulforaphane, a dietary isothiocyanate derived from its glucosinolate precursor which is found in broccoli, can prevent cartilage destruction in cells, in *in vitro* and *in vivo* models. In the next step of a subtle and progressing research programme, the team enrolled 40 patients about to undergo total knee arthroplasty and randomised them to either a high or low glucosinolate diet for 14 days prior to surgery. The analysis took place on the synovial fluid and the trial team were able to detect isothiocyanate in synovial fluid and changes in the expression of 125 differentially expressed proteins.

Deaths following large joint arthroplasty

Death following total joint arthroplasty is an issue that has been ignored until the arrival of the large arthroplasty registries that have shone a bit of a light on what is a rare, but serious problem. How many surgeons genuinely consent a patient for death prior to undertaking a hip or knee arthroplasty? We would venture not all, and in fact probably not the majority. As arthroplasty surgery has become more and more routine, and initiatives such as day-case total joint arthroplasty have become a

reality, the attention to pre-operative optimisation has waned somewhat. We were delighted to see this large series from the UK's National Joint Registry which was conducted in **Bristol (United Kingdom)**.[6] The authors set out to establish the main cause of death in a cohort of 717 565 large joint arthroplasties. The overall event rate was 7.8% in total hip and 7.6% in total knee arthroplasty, and these were matched to individuals in the population for age and sex. Around a third of the deaths were through metastatic neoplasia, and rates were similar in hip and knee arthroplasties. Other causes of death included respiratory failure (10%) and digestive system disorders (at just over 5%). The patients, however, had a lower overall standardised mortality rate (SMR, 0.61) when compared with the population control group. There are few studies of this size that quantify the mortality risk, or otherwise, of total joint arthroplasty. Although the SMR was favourable for joint arthroplasty patients, we were surprised here at *360* by how much. This is illustrative of how much fitter the standard arthroplasty patient is *versus* the general age-matched population. Perhaps more interestingly, the authors modelled the risk of death in the immediate peri-operative period and they found there was an elevated risk of death within the first 90 days, most commonly from heart-related issues and digestive system disorders. There appears to be a very low risk of cardiac-related death associated with joint arthroplasty, with an overall risk of 0.12%, so those of us consenting patients for death probably no longer need to do so!

Trial of pregabalin for acute and chronic sciatica

Despite its reported efficacy, there is little in the way of randomised trials to support the use of pregabalin in the majority of indications in which it finds use. Likewise, in spite of its widespread use (almost blanket-prescribing for certain diagnoses), there is scant evidence to endorse the use of gabapentin over standard analgesics or placebo. This is worrying considering that this is a drug with a reasonable side-effect profile. Researchers in **Sydney (Australia)** have set out to ascertain the efficacy of pregabalin in both acute and chronic sciatica.[7] The authors designed a randomised double-blinded placebo-controlled trial in patients presenting with sciatic symptoms. Patients were randomly assigned to receive either pregabalin at a dose of 150 mg per day, which was adjusted to a maximum dose of 600 mg per day, or matching placebo for up to eight weeks. The primary outcome was the pain intensity as measured by a 10-point Visual Analogue Scale (VAS). The efficacy of pregabalin was questionable based on the results of this study. The authors were able to randomise 209 patients to the study, and by week 8 the pregabalin group were suffering on average more pain than the placebo group (3.7 *vs* 3.1). However, by a year's follow-up, the pregabalin group were performing marginally better (3.0 *vs* 3.4) but these differences were not significant. However, what was significant was the difference in adverse events, with 227 reported in the pregabalin group and just 124 in the placebo group. We are reminded that, in the murky world of prescription medicine, all is not always as it seems and sometimes drugs that are indicated have no appreciable effect and suffer from a significant side-effect profile.

Strontium and bone remodelling X-ref

We were interested to see this review from **Porto (Portugal)** evaluating the evidence to support strontium incorporation in novel biomaterials as a potential method to promote bone formation or remodelling.[8] The authors conducted a systematic review with all studies surrounding strontium-enriched biomaterials. The authors screened 572 references in this hot topic area of basic science research and were able to include 27 in their final review. The majority of these were animal models, with a single human study. In all of these articles, there was a positive effect on bone formation, and this applied to both healthy bone and osteoporotic bone. There were no studies that demonstrated a decrease in bone formation. However, there were 13 local and four systemic adverse events reported in the literature, although gene expression data were available in seven studies and there appeared to be no long-lasting significant adverse events.

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