

therefore, the authors suggest using aspirin in low-risk patients to decrease the risk of infection. We would apply a hint of caution to these results.

Although presented as a comparative case series, all of the patients with aspirin prophylaxis were in the latter half of the series and it is certainly possible that other factors such as change in pathway may also have had a role to play.

Fluid collections not limited to metal-on-metal THR **X-ref**

■ One of the pathognomonic (we thought) features of an adverse metal reaction is the presence of fluid collections visible on metal artefact reduction sequence MRI scanning. Described in association with aseptic lymphocyte dominated vasculitis-associated lesion and often termed 'pseudotumours', these large fluid-filled collections have been associated with high rates of soft-tissue destruction and loss of muscle function, and consequently many of the poor results described after revision for

ALVAL are attributed to these so-called pseudotumours. In a study that challenges our understanding, here at 360, of what is going on with metal-on-metal (MOM) hips, researchers in **Arnhem (The Netherlands)** have asked the question 'is it just MOM hips that are associated with fluid collections?'⁹ Methodologically, this is a strong study, being a secondary analysis of a randomised controlled trial, and reports the outcomes of patients receiving either a resurfacing arthroplasty (n = 36), 28 mm MOM THR (n = 28) or conventional 32 mm ceramic hip (n = 33). All patients underwent cross-sectional imaging with a MARS sequence MRI scan. Follow-up was to 55 months, and the results were not quite what we expected. There were periprosthetic fluid-filled lesions in 13 patients; six of these were in the ceramic group, with six in the resurfacing group, as might be expected, and just one in the MOM hip arthroplasty group. Clinical scores were also presented

for all patients, but there was no apparent correlation between these and the incidence of periprosthetic fluid collections, which is not too surprising given the small size of the study. This finding of fluid-filled collections surrounding ceramic hip replacements requires urgent investigation – is our understanding of the process of ALVAL misdirected?

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Knee

X-ref For other Roundups in this issue that cross-reference with *Knee* see: *Hip Roundup* 3, 6, 7; *Wrist Roundup* 1; *Oncology Roundup* 7; *Paeds Roundup* 4, 5; *Research Roundup* 2, 3, 4, 5, 6, 7.

Albumin and complications in knee arthroplasty

■ While assessing patients who are undergoing elective primary total joint arthroplasty, surgeons strive to stratify risks and thereby optimise outcomes for patients. Much thought has been given to body mass index (BMI) as a predictor of both outcomes and complications, with some surgeons and healthcare systems using an upper BMI threshold to deny surgery due to the risk of increased post-surgical complications. A study team in **Philadelphia (USA)** set out to establish if there is a more subtle predictor of complications than the

blunt tool that is BMI.¹ However, this study of more than 77 000 patients importantly points out that other parameters such as serum albumin are arguably more important for assessing patients. Low serum albumin (< 3.5 mg/dL) was associated with increased surgical site infections (all levels), and many other major complications such as pneumonia, unplanned intubation, progressive renal insufficiency, cardiac arrest, and septic shock. Interestingly, morbid obesity was not associated with increased transfusion rates, while low albumin was. This does beg the question: is it the obesity itself or the often associated nutritional issues that are the most important determinant in outcomes in the obese?

Tantalum: a knee fixation for all seasons?

■ As candidates for arthroplasty are becoming younger and younger,

and living longer, the burden of revision surgery will increase into the future. Durable fixation in revision situations with poor bone stock is likely to be one of the major challenges of the next few decades. One of the responses of the implant industry to this challenge has been the development of porous metal implants, most commonly tantalum. An arthroplasty group in **New York (USA)** has been using tantalum cones in the proximal tibia to address revision-related bone defects in proximal tibial metaphysis.² There are a number of short-term series but no longer-term outcome studies relating to these implants, therefore their report of five- to eight-year follow-up is of interest. Although these authors report just 18 knees at this longer stage of follow-up, the results themselves are promising.

The authors report a combination of radiological outcomes and clinical outcomes (Knee Society Score) for this cohort of revision knee arthroplasties undertaken for both septic and non-septic indications. In total there were 26 individual tantalum cones: 13 each of tibial and femoral implanted for five cases of aseptic loosening, and 13 reimplantations for deep infection. There were two long-term failures requiring reoperation, both for infection, and the rest of the implants showed no evidence of loosening or migration of any kind with excellent improvement in post-operative results (31 points to 77 points). While these are clearly early and limited results, some inferences can be drawn from them. We would advise caution when using tantalum cones in septic revision scenarios, as patients have a higher likelihood of

reinfection, and as the cones integrate so well, removal in the light of infection may be very difficult. These are promising early results from a small series, but clearly more work is required here.

Dynamic knee alignment

Historically, the goal of TKA has been to restore neutral limb alignment with a square flexion/extension gap. There has, however, been a spate of recent studies focusing on the variations in alignment that occur with joint position, degree of weight bearing and gender. Despite advances in computer navigation and patient-specific instrumentation, there is still a cohort of patients that are unsatisfied following TKA, and some authors are attributing these cases to alteration of the patient's normal limb alignment. Various studies have reported on the variation of limb alignment between genders and different positions; however, the weakness of many of these studies is that they report on patients with OA and after TKA. A study team from **Glasgow (UK)** and **Madhapur (India)** describe the variation in alignment of 132 patients (264 knees) in healthy volunteers. The researchers used the Orthopilot navigation system to measure the femorotibial mechanical angle (FTMA) across a range of positions. The mean supine alignment was a varus angle of 1.2° , which increases to 3.4° on standing. Alignment differed significantly between males and females ($p = 0.008$). This study³ has its inevitable limitations such as using cutaneous trackers rather than bony attachments, however, prior to this study, normal variations in alignment using the FTMA between gender and flexion position were unknown. Currently, the goal of TKA is to restore neutral limb alignment. However, based on this study, this aim may not be correct, as the majority of 'normal' people do not have neutral alignment, and intra-operative neutral alignment may translate to varus alignment in weight

bearing. The authors conclude that limb alignment is dynamic and suggest that variations between gender and posture should be considered prior to TKA. There are, nonetheless, still a number of unknowns. It is not yet clear how arthritic change varies position and, indeed, if restoring a more physiological axis can give better clinical results.

Tibial component design in UKA

Unicompartmental knee arthroplasty (UKA) is gaining in popularity due to the excellent functional results, despite concerns over its longevity. There is however a paucity of data comparing different UKA implant designs and survival rates. Researchers in **Montréal (Canada)** set out to unpick the potential pros and cons of metal-backed or all-polyethylene tibial components in fixed bearing unicompartmental knee designs.⁴ They conducted a single blind randomised trial at a single institution comparing the two tibial implant designs. Their study concerned 45 patients (63 knees), all of whom underwent a UKA using an Accuris UKA system, and patients were randomised to either a cemented all-polyethylene or metal-backed modular tibial component. Follow-up was reported to 6.4 years, by which point 11 of the 27 (41%) patients in the all-polyethylene group had undergone revision, the majority ($n = 10/11$) for aseptic loosening, with Kaplan-Meier survivorship analysis at seven years giving a survival of just 56.5% compared with 93.8% in the metal-backed group. Despite the poorer survival rate, the all-polyethylene group had significantly better mean WOMAC scores (13.4 vs 23), but similar KOOS scores (68.8 vs 62.6). While the

authors argue that each design has its own advantages and disadvantages, with failure rates like this, the all-polyethylene implant can be said to be not to be fit for purpose.

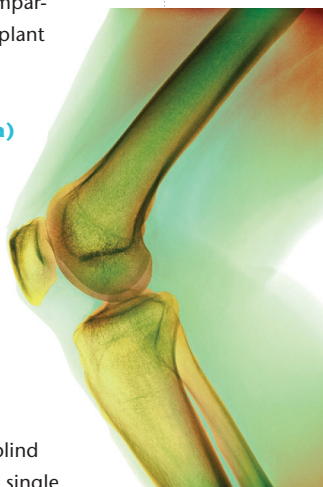
Managing the tidal wave of revision knee arthroplasty

For a fair few years there have been predictors of a rising unmet need for revision knee arthroplasty. Given the growing prevalence of total knee arthroplasties, combined with increased patient life span and increasing rates of osteoarthritis, it does look like there may be a 'perfect storm' brewing. While the revision rate following TKA is very low, these procedures can be challenging, with loosening associated with bone loss. In an interesting view of what the future may hold, and how to address the potential difficulties associated with this revision burden, researchers in **Edinburgh (UK)** reviewed the evidence to date.⁵ Perhaps the key question orthopaedic surgeons must ask, given the burden of an increased number of patients undergoing TKA and high numbers of unsatisfied patients or failures after TKA, is how do we improve clinical outcomes for the growing number of dissatisfied patients? The authors of this article suggest that based on the increased criteria for TKA, a re-revision procedure will become increasingly common. With one in ten patients who were younger than 55 years old at the time of primary TKA having their first revision around age 65, it is reasonable to suppose that 20% of these patients will require a second revision by the age of 75. The authors suggest that

future resources should be focussed on supporting specialist groups that can provide specialised care for patients requiring revision TKA.

Scoring pain in TKR

The goal of total knee arthroplasty (TKA) is to restore function and decrease pain. The much discussed problem of the '5%' of patients who develop persistent pain following TKA has troubled knee surgeons for decades. Assessing pain can be difficult, and the results vary markedly depending on the instrument used. It is traditional to utilise a range of knee-specific outcome scores such as the Knee Injury and Osteoarthritis Outcome Score (KOOS) or more generic measures such as the Visual Analog Score (VAS). There are, however, a range of other pain specific scales including measures of somatisation and neuropathic pain. In this retrospective review, researchers from **Lund (Sweden)** attempted to shed some light on the difficult subject of scoring pain post total knee arthroplasty.⁶ Their study population consisted of 2123 patients identified from the Swedish Arthroplasty Register whose operations were carried out at two units in Sweden. The cohort all had pain and functional scores recorded pre-operatively and one year post-operatively. This report concerns 220 patients who reported increased or unchanged pain following surgery, with 50 (23%) reporting increased or unchanged pain on both the VAS and KOOS. Patients who experienced no pain relief on either pain scale tended to have high anxiety or depression indices pre-operatively. Interestingly, the scores used to assess pain dramatically altered the results, with the VAS scale resulting in twice the number of patients reporting no pain relief following a TKA compared with using the KOOS to assess pain (55 vs 115 patients, respectively). The authors suggest that when considering pain assessment following TKA, the level of



pre-operative pain should be taken into account, with those with lower pre-operative pain scores appearing to have the least benefit post-operatively, as would be expected. They also make the observation that the observed relief in pain may vary depending on the instrument used to measure pain.

Does anyone have a 'normal' tibial slope? X-ref

■ With coronal plane geometry causing quite a stir in the collected scientific press at the moment, and a gathering of supporters of so-called 'anatomic alignment' in knee arthroplasty pointing out that many patients may in fact have far from normal alignments in the coronal plane, we were delighted to see this paper from a study team in **Balikesir (Turkey)** who took on the challenging task of analysing 13546 CT scans with the express intention of describing the sagittal plane alignment – and, specifically, the normal posterior tibial slope.⁷ Using scans of osteoarthritic knees, the researchers calculated the posterior tibial slope angle in established disease. They established a wide range of alignments exist, with an average posterior tibial slope of $7.2^\circ \pm 3.7^\circ$ (range, -5° to 25°) with little difference between sexes. Given accepted normal ranges, the authors would have classified around a third of patients as outliers. Although the authors conclude that “these data can be useful to determine optimum techniques and methodology to perform more accurate TKA,” we would venture that these data are no more compelling than those for other variants of 'anatomic' knee alignment. What we do not know is if the variation really is normal, causative of the disease process or symptomatic of knee disease. We know that in varus OA, the loss of medial joint space is part of the disease process, not normal variation. Before implanting knee arthroplasties with as much

as 24° of posterior slope, we would really like to see a well-designed study establishing the normal alignment of these joints in patients without OA.

Cross-linked polyethylene in TKA A five-year clinical study X-ref

■ The goal of an everlasting joint replacement seems a remote one at the moment in knee arthroplasty. While ceramic articulations in the hip have provided bearings that essentially don't suffer enough wear to be clinically relevant in the lifetime of most patients, the same technology is not suitable for knee arthroplasties. Even the now relatively standard highly cross-linked polyethylene (XLPE) has some potential drawbacks in the knee. A process that makes the polyethylene more brittle and susceptible to the delamination and fatigue failure seen in TKA has led some naturally suspicious surgeons to doubt its benefits. Combined with concerns about the biologically-active particulate load actually increasing (while total volumetric wear decreases), we may have some very justified concerns about its use in TKA. In a pragmatic approach to addressing some of these concerns, clinicians in **Indianapolis (USA)** have reported their results in posterior-stabilised knee arthroplasties (where wear on the peg raises some particular concerns).⁸ The authors report the results of 114 consecutive posterior-stabilised total knee replacements, of which 50 utilised conventional polyethylene and 64 XLPE. Outcomes at five years seem to suggest a slight advantage to the XLPE group, with superior KSS scores and SF-36 physical performance scores. There was no difference in radiographic evidence of osteolysis or macroscopic failure of the tibial insert. In this mid-term follow-up study, there were no deleterious effects associated with using highly cross-linked polyethylene in PS TKA designs at five-year

follow-up. The potential benefits in terms of reduced wear debris will, we hope, be addressed in a report of the next five years' results!

Spacers and infected revision arthroplasties X-ref

■ The use of the antibiotic-loaded spacer (either custom or pre-fabricated) as part of a two-stage revision for proven infected knee arthroplasties is considered the 'gold standard' the world over. The combination of dead-space management, antibiotic elution and maintenance of soft tissue envelope makes the spacer an essential tool for the revision arthroplasty surgeon. A study team in **Philadelphia (USA)** examined their own series of over 500 cases of revision arthroplasties treated with a two-stage 'spacer'-based approach. In their series,⁹ the use of the spacer facilitated reimplantation of a definitive joint replacement in 417 patients, with around 80% of these successfully treated. The authors waited on average around four months to reimplant a total joint arthroplasty. Overall, 87 cases (17.3%) did not result in successful reimplantation. In those where it was not possible to revert to an arthroplasty, 14% underwent amputation or a Girdlestone's procedure, with 5% requiring arthrodesis and the remainder retaining the spacer (83%). The authors make the very valid point that despite the general view that two-stage revision arthroplasty with a spacer yields good results, the rates of failure of salvage are still surprisingly high.

Dialysis and arthroplasty X-ref

■ In a short and to-the-point paper, surgeons in **Baltimore (USA)** set out to examine the success or otherwise of arthroplasty in patients who are undergoing haemodialysis for renal failure.¹⁰ As survival for patients with end-stage renal failure is increasing, there is a mounting burden of patients with

a variety of underlying pathologies requiring renal transplantation. Using the national inpatient sample of over 6 million patients who had undergone hip or knee arthroplasties, 2934 patients who were dialysis-dependent were compared with 6 186 475 patients who were not. Outcomes were assessed in terms of inpatient mortality and complications. With regards to hip arthroplasty, dialysis patients were younger, had higher inpatient mortality rates (1.88% vs 0.13%) and complication rates (9.98% vs 4.97%). As perhaps might be expected, dialysis was an independent risk factor for mortality (OR 6.66) and complications (OR 1.53). There was a similar story in the knee arthroplasty group, and although patients were similar in age (66.7 vs 66.8 years) the investigators still identified higher inpatient mortality rates (0.92% vs 0.10%) and overall complication rates (12.48% vs 5.00%). We agree wholeheartedly with the authors' view that “Arthroplasty should be approached with caution” in these patients, and clearly patients wanting TKA or THA should have a clear and frank discussion on the risks specific to dialysis.

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Foot & Ankle

X-ref For other Roundups in this issue that cross-reference with *Foot & Ankle* see: [Research Roundup 2, 3, 4.](#)

The midfoot fusion bolt: has it had its day?

■ It's fair to say that the prevention of deformity in Charcot neuroarthropathy of the foot is an unsolved problem, and one that carries with it some of the biggest risks and comorbidities in foot surgery, with amputation not an uncommon outcome. As a concept, intramedullary support of the entire medial column is intuitive and appealing. However, the published results from practical implementation have been less than impressive. A group from King's College Hospital, **London (UK)** present the results of their small series of patients treated with a 6 mm solid bolt.¹ In their small cohort of nine patients, all but two developed a nonunion in at least one joint, and six patients experienced a significant complication in the form of migration of the nail. It should be noted that all patients had active ulceration at the time of surgery and that deep infection may have contributed to failure. These results reflect those from other series, indicating to us here at 360 that in its present form, this implant is not functioning as intended. The manufacturers have recently changed the operative technique to include a recommendation to augment the device with other devices such as staples and plates. While the concept itself may well be sound, it is clear that in its application at least, even experienced surgeons

haven't yet established how to make it work.

Ankle arthroplasty: only for the old?

■ Although the outcomes of total ankle arthroplasty are improving, the majority of surgeons and indeed device manufacturers regard ankle arthroplasty as the preserve of the elderly. Ever willing to challenge preconceived ideas and 'handed down wisdom', researchers in **New York (USA)** set out to define what the effect of age actually is on both longevity and clinical outcomes in patients with end-stage ankle arthritis treated with modern total ankle prostheses.² This study primarily concerns the results of 395 patients, all receiving total ankle arthroplasties (TAA), with their results sadly being stratified by age (rather than treating age as a continuous variable) and reported to a mean follow-up of just 3.5 years. While the authors conclude that, based on their results, there were no differences in revision or complication rates in the younger cohort, we really do have to take some exception with this conclusion. When follow-up is just to 3.5 years we would like to see this series reported to a longer outcome and perhaps with some slightly better statistical methods!

A return to the Keller's osteotomy procedure for diabetic feet?

■ The care of the neuropathic diabetic foot is labour intensive and often tricky, requiring an acceptance of complications and a well functioning multidisciplinary team.

The surgery can be life-changing to patients, with a not insignificant risk of complications. The majority of surgical interventions are aimed at treating neuropathic ulcers and their sequelae for the soft tissue and bones of the foot and ankle. A team from **Tel Aviv (Israel)** publish their results of resection arthroplasty of the first metatarsophalangeal joint as a salvage treatment for non-healing plantar ulcers overlying a deformed joint.³ This cohort study describes promising results from a small series of 28 operations for ulcers recalcitrant to all standard offloading interventions. These results were encouraging, with the primary ulcer healing in around three weeks. However, as perhaps would be expected, there were a number of complications, with an incidence of dehiscence and infection of around 20%, and a similar recurrence rate seen one year after surgery. This may seem disheartening, but in the context of treatment of the diabetic foot it represents a viable salvage option in an attempt to avoid more radical ray amputations or similar resections which inevitably unbalance the foot.

Joint sparing surgery for ankle arthritis in the context of deformity?

■ The current standard of care for advanced arthritis of the ankle joint is arthrodesis or arthroplasty. However, both procedures have disadvantages, and plenty of page space has been devoted in 360 to discussion of the pros and cons of each. Joint preservation surgery, especially in the younger high-demand patient,

is popular in other branches of orthopaedics, and we were intrigued to see this gait analysis-based study⁴ from a transatlantic collaboration between **Basel (Switzerland)** and **Salt Lake City (USA)**. There were, however, only a few (eight) patients included in this evaluation of the supramalleolar osteotomy compared with the contralateral (normal) limb and with a matched group of controls. While the research team observed clear evidence of stiffness in the affected limb, the other limb remained normal. The osteotomy patients had higher pain scores but their quality of life scores were identical to the control group. These results, although very small in number, were significantly better than published quality of life data for matched patients with untreated ankle arthritis. Perhaps there is some utility in joint preserving options in ankle arthritis; we were interested to read this study and, although far from persuasive, it has certainly piqued our interest.

Beware the subtalar fusion in the ankle arthrodesis patient?

■ Progression of hind or midfoot arthritis to an adjacent joint post-fusion is a reality of reconstructive foot and ankle surgery. The group from Duke University, **Durham (USA)** have published their results of a small series of 13 patients, all of whom had a subtalar fusion following a successful ankle fusion in the ipsilateral limb.⁵ The research team compared the results of these 13 'secondary fusions' with a further