sophisticated imaging techniques such as dGEMRIC MRI will enable better patient selection?

The antiquity of the cam deformity X-ref

■ In what is a gem of an anthropological paper from **Cambridge (USA)**, researchers seek to establish the origins of the femoral cam deformity by comparing modern observations with those of a group of 249 proximal femora from the Libben osteological collection of a population of humans living over 1000 years ago.[7] The authors found differences in anteversion, neck-shaft angles and alpha angles. None of the specimens examined met the criteria for a cam deformity. The authors venture that the cam deformity appears to be a modern development, and may be a byproduct of modern stresses placed on the hip joint; not, as has been suggested, the result of an older anthropological development due to bipedal gait.

Establishing risk factors for periprosthetic infection X-ref

■ Total joint arthroplasty is an extremely successful procedure in alleviating pain and restoring mobility in patients with hip and knee arthritis. More and more patients continue to benefit from these life-improving procedures. However, prosthetic joint infection (PJI) is a devastating, albeit rare, complication for the patient and the surgeon alike. Prevention plays a key role in dealing with this significant complication. A number of medical conditions have been identified as risk factors for infection. The authors of this paper from **Philadelphia (USA)** attempted to further describe which risk factors are important for PJI and how best to prevent infection based on a review of the current medical literature.[8] The treatment for PJI is lengthy, costly and life-changing for the patient and anything we can do to reduce their risk for PJI is time well spent. This paper is an excellent review of current best evidence.

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Knee

X-ref ***For other Roundups in this issue that cross-reference with Knee see:*** *Hip Roundups 1, 2, 3, 8; Research Roundups 2, 3, 7, 8; Paeds Roundups 3, 8.*

Uncemented unicompartmental knees at five years X-ref

■ Unicompartmental knee arthroplasty (UKA) remains a slightly controversial intervention in the knee world. Few would argue that, when it works, UKA potentially yields the best functional result for patients with isolated single compartment osteoarthritis. That having been said, detractors would argue that the problem of revision, shorter longevity and difficulties with progress in other compartments outweigh the potential benefits. While the registry data-reported revision rate shows an increased burden when compared with TKA (usually the result of radiolucent lines), those registries and large series that have included patient-reported outcomes show that these outcomes exceed those of TKA. Using a previously reported cohort of randomised controlled trial patients studied in a non-designer series, researchers in **Christchurch (New Zealand)** reported on functional outcomes of patients receiving an uncemented Oxford UKA.[1] The study includes only those who received a cementless knee, and reports the presence of radiolucent lines (RLLs) and implant survivorship at a minimum of five years in the first consecutive 126 patients (150 knees) who received a cementless Oxford UKA. The mean age in this series was 63.6 years and included 81 males (53.1%). At five years the authors report excellent functional outcomes with no progressive RLLs. However, the picture was not completely positive, with five patients (six knees) undergoing further surgery: two for revision to TKA, two bearing exchange due to dislocation, and one patient underwent bilateral UKAs due to progression of arthritis. There was no radiographic evidence of subsidence or femoral lucency. This study supports the use of a cementless UKA which in itself was designed to overcome the difficulties of progressive radiolucent lines seen with the Oxford UKA. Based on the independent mid-term results presented here, the cementless Oxford UKA has shown a 98.7% survivorship at five years with good functional outcomes, and the new design has a low incidence of RLLs.

Personalised instrumentation a gimmick or not? X-ref

■ Patient-specific instrumentation (PSI) has arrived and is one of the hottest topics from an industry perspective. The manufacture of large sets of instrumentation and keeping a whole inventory of components is a significant industry-associated cost. With the allure of a 'high tech' option along with the potential to reduce inventory and instrumentation costs for companies and hospitals alike, personalised arthroplasty has gained some early traction. The literature, however, suggests mixed results with reports of the fluctuating accuracy of PSI, which may be attributable to a range of potential variables, one being the various systems of implant designs reported in each study. In a nicely executed study taking advantage of their large personal series, researchers in **Chicago (USA)** were able to compare over 200 knee arthroplasties performed with either the NexGen Cruciate Retaining (CR) or Persona CR implant,[2] (Milpitas, CA) both achieved with the same PSI cutting system. The authors report femoral and tibial component alignment outliers for 96 consecutive Persona CR implants and 123 NexGen CR flex implants. The incidence of

femoral component outliers was significantly greater in the Persona implant group (23.9% *vs* 13.4%), while coronal tibial alignment was poorer in the NexGen implant group (10.9% *vs* 22.7%). Despite this change in individual component outliers, there were no differences in the overall mechanical axes or sizing accuracy. This study makes a simple but potentially important observation that the variable outcomes in the literature may be due in part to differences in implant design that influence the accuracy of bone resection and component alignment which become particularly acute when using patient-specific instrumentation.

Cross-linked polyethylene in total knees? X-ref

■ The process of cross-linking polyethylene (XLPE) results in cross-linked bond formation between chains. While this improves the surface wear properties of the polyethylene and there is ample evidence in hip arthroplasty that these newer polyethylene manufacture processes reduce the rate of wear, there is an associated increase in stiffness and brittleness of the polyethylene. There is some evidence that increased stiffness may predispose to peg fracture in posterior stabilised (PS) designs, and to subsurface wear and failure in all designs. There is little clinical data, however, to point one way or the other. Reasoning that in total hip arthroplasty, XLPE has low wear, good results and is now considered the 'gold standard', investigators in **Indianapolis (USA)** designed a prospective cohort study with the intention of determining the success of the implants in a clinical study.[3] The authors conducted a prospective cohort study of 114 consecutive patients, all with posterior stabilised total knee arthroplasties. In 50 knees, conventional polyethylene was used, and in 64 knees an identical, but XLPE, tibial insert was used. There was selection bias evident, with significantly younger patients in the XLPE group (67.3 *vs* 63.8) leading us to discount the reported differences in clinical outcomes as the groups were not comparable. Allowing for losses to follow-up and revisions for infection, 103 patients had a five-year follow-up. Average follow-up in the conventional group was 5.5 years compared with 5.2 years in the XLPE group. No mechanical failure or radiographic osteolysis was observed in either group at mid-term follow-up, however, this is not adequate follow-up to determine the longevity of XLPE in PS knees. Future studies are necessary with longer follow-up to accurately assess wear resistance and mechanical properties of XLPE in PS knees over time.

Patient selection of patient-specific instrumentation X-ref

■ Patient-specific instrumentation (PSI) has been a mixed success and the promise of restoration of mechanical alignment with shorter surgery time, decreased instrumentation and better clinical outcomes is yet to be proven. In this prospective study with an unusual study design, surgeons in **Singapore (Singapore)** reported the outcomes of 60 patients undergoing total knee arthroplasty (TKA).[4] In this comparative series patients were divided into two groups: PSI surgery or conventional TKA based on their own preferences. Those with pre-operative varus or valgus deformity of more than 11° or fixed flexion deformity were excluded from the study. Functionally there was little to choose, with Oxford and SF-36 scores comparable between groups. The Knee Society Score, however, was significantly better (9 points ±3) in the PSI group post-operatively, however, this evened out by the two-year follow-up. There were no differences in duration of surgery (58 minutes for both groups) or complication rates. While PSI may provide certain benefits for the hospital, with no increased clinical benefit, the additional cost and waiting time incurred by patients cannot justify PSI surgery.

Recurrence of periprosthetic knee infection X-ref

■ Periprosthetic joint infection accounts for some of the poorest outcomes, both clinically and financially, following total knee arthroplasty (TKA). The most devastating of these outcomes are those in which the infection cannot be eradicated. In an effort to identify factors associated with unsuccessful treatment, surgeons in **New York (USA)** reviewed their outcomes for 110 serial patients who underwent two-stage revision knee surgery for infection.[5] Recurrence of infection was diagnosed in 15 patients after two-stage re-implantation, occurring at an average of 101.4 days and all patients required additional surgery. This study identified the following significant risk factors for recurrent PJI: chronic *Staphylococcus* carriers ($p = 0.018$), inflammatory arthritis ($p = 0.013$), pre-operative haematoma formation ($p = 0.042$) and wound dehiscence ($p = 0.042$). When looking at combined risk factors, patients with a post-operative wound dehiscence (OR 5.12) and carriers of *Staphylococcus aureus* (OR 11.4) had a significantly increased risk of re-infection. While the results of this study found that inflammatory arthritis, wound dehiscence, haematoma formation, and chronic *Staphylococcus* carriers are independent risk factors for recurrence of infection, a larger sample size study would be ideal to confirm these findings.

Joint laxity and knee balancing

■ Soft-tissue balance continues to be a bit of a sticky wicket following the addition of 'anatomic balancing' to the orthopaedic lexicon. The stimulation of this debate has spilled over a little and consideration of the finer points of ligament balancing as gap-balancing and kinematic alignment. This current study from **Davis (USA)**[6] aimed to evaluate the effects of knee laxities at 0°, 45°, and 90° of flexion. This cadaveric study included the results of ten cadaveric knees with laxity measured in different degrees of flexion. The testing was done in a standardised testing rig applying axial loads with additional varus-valgus and internal rotation forces. Despite the general interest surrounding the topic, it is important to remember that this study was performed in cadavers, and the findings were that five of the seven laxities had differences that may not have clinical significance (1.7°). Additionally, while this cadaveric study demonstrates variations in tissue laxity, this cannot be directly translated to the clinical scenario, and while difference may exist in different degrees of flexion, it does not fully discount gap-balancing, and further studies are needed to explore this.

Not as easy as 'ABC': uni revision under the spotlight

■ One of the major draws to the unicompartmental knee arthroplasty in younger placements is the prospect that revision of a replacement may yield similar longevity and functional results to those of a primary total knee arthroplasty. The truth or otherwise of this conjecture is key to interpreting the results of unicompartmental knees. If the revision surgery is similar in outcome to a primary joint replacement then the poorer longevity of a unicompartmental knee is justified by the 'nothing lost' argument. If, however, the revision is similar in outcome to a revised primary knee, then the

question of the role of unicompartmental knees becomes much more complex. A study team based in **Marseille (France)** have attempted to unpick at least some of this tough-to-resolve question by examining the complexities of the revision surgery.[7] The team undertook a case-matched study, with 48 unicompartmental revisions matched carefully to 48 primary and 48 revision knees in their centre. The results of their study are suggestive that at their mean follow-up of seven years, functional outcomes and survivals of revision unicompartmental knee arthroplasty are more akin to revision knee arthroplasty than primary knee replacement. The authors make the argument that even if this is less challenging surgery than 'full' revision knee, the clinical outcomes aren't as flawless as proponents of the technique would have us believe.

The big questions first X-ref

Some of the major questions in surgery have never been answered. While the push for evidence-based medicine is clearly a strong and well-reasoned one for some interventions, perhaps the answer is self-evident – in the same way that parachutes will never be subjected to a randomised controlled trial, neither will chest drains for tension pneumothoraces. Somewhere beneath these self-evident truisms, however, lie accepted interventions (such as TKA and ACL reconstruction) that don't always stand up to evaluation in a randomised control trial setting. While hundreds of thousands of patients undergo total knee arthroplasty (TKA) each year, there is surprisingly little actual efficacy evidence comparing TKA with non-operative treatment, partly due to the difficulties associated with recruiting to such studies. We were heartened, here at *360*, to read a report in the *New England Journal of Medicine* of a simple, randomised controlled trial performed in **Aalborg (Denmark)** comparing TKR with non-operative treatment.[8] This randomised controlled trial of 95 patients reported outcomes of the KOOS score at one year for patients randomly allocated either to knee arthroplasty plus 12 weeks of non-operative treatment, or the non-operative treatment alone. The non-operative treatment consisted of exercise, education, dietary advice, use of insoles, and pain management. Patients' outcomes were reported on an intention-to-treat basis and 25% of the non-operative group received a TKA within the one-year follow-up period of the study, with the operative group also benefiting from a greater improvement in the KOOS score (32.5 point improvement *versus* 16 points). However, there was also a higher rate of serious adverse events (24 *vs* six events). With a 25% crossover rate and greater improvement in outcome scores in the operative group, it seems self-evident that the benefits of TKA are now 'evidence-based'. This kind of well-controlled study is extremely useful not only in justifying treatment, but in allowing estimation of effect sizes and as a benchmark against which to judge other interventions.

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Foot & Ankle

X-ref ***For other Roundups in this issue that cross-reference with Foot & Ankle see:*** *Research Roundup 7; Trauma Roundup 3, 9.*

Scarf-Akin osteotomy in adolescent hallux valgus X-ref

The traditional teaching for juvenile and adolescent hallux valgus is to postpone treatment until skeletal maturity. Researchers in **Sheffield (UK)** set out to establish if there is a genuine issue with higher rates of complications such as stiffness and recurrence if the surgery is undertaken before skeletal maturity.[1] The publication concerns 47 feet, all undergoing a Scarf-Akin osteotomy for hallux valgus, all operated on by a single surgeon. Patients were aged around 11 and radiographic measurements were taken from the six-week radiographs. Results were all acceptable at that stage, however, there were recurrences reported in 14 feet (30%), with one in five symptomatic enough to require revision surgery. Given the high recurrence rates, the authors recommend delaying surgery until skeletal maturity which seems sensible.

Osteochondral defects in the ankle X-ref

In one of the only large series reporting outcomes of paediatric and adolescent osteochondral defects (OCD) of the ankle, these authors from **Boston (USA)** were able to report the outcomes of 109 ankles in 100 patients.[2] All patients had an osteochondral defect of the ankle were aged under 18 and had over three years of follow-up. Outcomes were assessed in terms of return to sport and the Foot and Ankle Outcome Score (FAOS). In this retrospective report of a large number of cases, the commonest lesion was the medial talus (73%) and the majority of patients were treated with either transarticular drilling (54%), fixation (20%) or microfracture (26%). Re-operation rates were high, with around a quarter of patients requiring a further procedure. Perhaps not quite so much can be gleaned from the patient-reported outcomes, as less than half the patients responded to the survey. However, for what it's worth, 82% of respondents were satisfied with their outcome and 84% returned to sport. The authors were able to comment with a reasonable degree of certainty that female patients and those with a high BMI were likely to have poorer outcomes with the FAOS score.

Inflammatory cytokines and matrix metalloproteinases in ankle fracture X-ref

The aetiology of arthritis in general is still a mystery, with a clear attributable cause in only a handful of cases. In the ankle, post-traumatic degeneration is a common cause and is often witnessed despite anatomical reduction and expedient treatment of osteochondral defects. Although the cause is understood, the mechanism is not. Investigators from **Durham (USA)** propose a role for inflammatory cytokines in the mediation of post-traumatic osteoarthritis in this elegant study,[3] although in itself this is nothing new