ROUNDUP360

Hip & Pelvis

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

Back to the acetate? X-ref

Surgical planning is held by many to be the key to success, and many hospitals have invested large sums of money in expensive computer-aided templating software for arthroplasty and trauma surgery. However, there is little evidence that this electronic templating is better than the old fashioned acetate templates. In the era of cost containment, finding ways to reduce costs is paramount, and with pre-operative templating for total hip arthroplasty using digital systems in general having been shown to be beneficial, the question is, does digital templating confer a similar degree of accuracy with lower costs? A study team from **Vancouver (Canada)** set out to compare digital templating with acetates. The study team included 52 total hip procedures, and in each case five observers performed digital- and acetate-based templating using a 25 mm marker as a reference. Outcomes were compared with actual implants inserted at the time of surgery. Intra- and inter-observer reliability were compared for both methods. Using the bar of success as 'within one size', the accuracy was similar for acetate *versus* digital templating in the acetabulum (77% *vs* 70% respectively), while surprisingly the acetate method gave a more accurate prediction of femoral stem size (75% *vs* 60% respectively). There were similar intra- and inter-observer agreements, however, the acetate templating was quicker (119 seconds *vs* 154 seconds). Templating is not yet mandatory, and with systems only between 60% and 75% accurate to within one component size, one could argue about the benefit at all. Nonetheless, there certainly does appear to be a case for surgeons to utilise the quicker, cheaper and more accurate method of acetate templates rather than using expensive commercial software.[1]

'Off-label' lower limb arthroplasty X-ref

Implantation of devices 'off-label' refers to the use of an implant for an indication, or a patient population, other than that for which the regulatory authority has approved its use. The USA has a uniquely stringent system for device regulation through the Food and Drugs Administration (FDA). With a higher than average rate of restriction there is always the risk that surgeons will ignore a regulatory body if it is perceived to be overcautious or restrictive, and implants will be used 'off-label'. Surgeons in **Orange County (USA)** set out to establish what the incidence of 'off-label' implant use in hip and knee arthroplasty was in the USA over the decade between 2000 and 2010.[2] In what is a simple message, the authors highlight a growing incidence of 'off-label' use, with a rise from 30.4% to 37.0% between 2000 and 2010. They predict that if the trend continues by 2040, the majority of both hip (86%) and knee (95%) arthroplasties will be used for off-label indications. Given the clear disparity between licensed use and clinical practice in this area, we would agree with the authors that the surveillance and regulatory arrangements for arthroplasties in particular in the US clearly need some further investigation.

A second wind for ceramic-on-ceramic? X-ref

The search for an effective hard-on-hard bearing surface has been fraught with difficulties on both sides of the pond. While in the UK and Europe the early adoption of resurfacing and metal-on-metal bearings has led to difficulties with adverse metal reactions (e.g. ALVAL), in the US the incidence of 'ceramic-squeak' has caused more trouble. Due to concerns about both failure and complication rates in ceramic-on-ceramic implants, the venerable ceramic-on-plastic or metal-on-plastic have become increasingly popular. Despite this, there are few direct comparisons in the longer term. With the potential for lower volumetric and particulate wear debris, we were delighted to see authors from **Rouen (France)** tackle this tricky question.[3] In what was admittedly a retrospective study, the research team evaluated 240 patients undergoing revision arthroplasty with a normal contralateral hip. The overwhelming majority (n = 235 / 240) were isolated acetabular revisions and, adding strength to this study, all patients had received identical implants with a 32 mm ceramic head – only the acetabular liner differed. The study team undertook both pre-operative MRI scanning and bone marrow aspirates, allowing them to investigate any muscle changes between the two groups, along with muscle progenitors expressed in the bone marrow MSCs. Revision was performed using identical implants in all cases and the mean period of follow-up was an impressive 14 years. Surprisingly, there was a higher dislocation rate among those with polyethylene liners than ceramic at the time of revision arthroplasty (18% *vs* 1%). The surgeons noted marked differences in the soft tissues between the two groups, with no signs of soft-tissue lesions at the time of revision arthroplasty in the ceramic group but osteolytic and soft-tissue lesions visible in all of the primary polyethylene liner arthroplasties. This marked change was also seen on cross-sectional imaging and supported by a lower incidence of muscle progenitor cells in the bone marrow biopsies. When looking at all revision patients, alumina-on-polyethylene patients had greater dislocations, more osteolysis, greater muscle fatty infiltration, less mesenchymal stem cells from iliac crest bone marrow, and decreased muscle satellite cells. Thus, there is still a clear benefit to using ceramic-on-polyethylene implants. Further studies are clearly justified to study the newer delta ceramics. However, we would congratulate the authors of a rather rare paper with large numbers of carefully followed-up revision joint arthroplasties with not only a primary study observation but a nicely argued discussion with some basic science data to at least partly explain their observations.

Resurfacing and cementless arthroplasty in the younger age group

The problem of hip arthritis could (and has) been said to be solved, as many arthroplasties have an expected longevity of longer than the patients into whom they are implanted. This statement, while true in the typical hip arthroplasty patient (usually over the age of 70), patently doesn't hold true in younger patients. There is accumulating evidence that the performance of arthroplasty designs is age-specific, and one of the trickiest age groups in which to tease out what is the best option for the under 55s. Two popular options for these younger patients with hip arthritis are the uncemented hip arthroplasty and the Birmingham hip resurfacing (BHR) procedure. Both of these options have data to support their use and philosophically both are a potentially attractive option. Researchers in **London (UK)** present one of the only randomised studies to report long-term follow-up data.[4] Although a study of 80 patients was planned, in common with many different intervention studies, recruitment was a problem, with a total of just 24 patients being randomised as patients struggled with the concept of a randomised intervention. A total of 18 patients refused a hip resurfacing and 38 insisted on having a hip resurfacing. Nonetheless, the results were analysed based on an intention-to-treat basis. The authors demonstrated similar outcomes using conventional outcome measures such as the Harris Hip score, Oxford Hip score and the UCLA activity score. However, they also reported the UCLH functional outcome designed to avoid the 'ceiling' effect of conventional scores in younger patients. When considering the UCLH outcome measure, more patients in the BHR group were able to complete specific functional tasks such as a better single leg stance and hop, as well as better stair climbing endurance and participating in a sport of their choice. Patients' expectations regarding their functional outcome were similar for both groups, however, there is the possibility that patients receiving a hip resurfacing were somehow biased and would aspire to do more once they knew that they had received a hip resurfacing. This is difficult to extract from this study data and would necessitate patient blinding. Perhaps most importantly, the authors did not demonstrate any reaction to metal debris or pseudotumours on MRI scans performed in 72 patients who underwent testing for metal ions. With careful patient and implant selection, together with accurate positioning of the implants, it is possible to achieve an excellent functional result from the BHR, and the data presented here would lead us to venture that perhaps in this group at low risk of metallosis, the BHR may be a reasonable option.

Acetabular anteversion: bridging the gap between hip and spine surgeons X-ref

Many patients presenting in the outpatient setting have co-existent spine and hip pathology, presenting a "chicken and egg" conundrum. However, counterintuitively these two problems are often managed independently of each other, not yielding the joined-up decision-making required, and resulting in a poor outcome for the patient. The authors of this interesting paper from **New York (USA)** make the observation that sagittal spine deformities are often compensated with hip extension, and that pelvic tilt is therefore a 'compensatory mechanism' to maintain an upright posture.[5] As a result, any change to spinal sagittal alignment can cause changes in the version of the acetabulum. The authors make this assertion following a retrospective analysis of a multicentre prospective database of patients with an adult spinal deformity. The results were available of just 33 patients who had undergone a total hip arthroplasty (THA) prior to a spinal realignment procedure. Acetabular version was calculated using the 'ellipse method'. This study reveals a significant increase in lumbar lordosis and sacral slope pre-operatively. In addition, the acetabular anteversion significantly decreased following spinal correction surgery with a mean reduction of around 5° (between -22.32° and 2.36°). Interestingly, of the 41 hips, 68% had excessively anteverted acetabular components (> 25°) pre-operatively. This compared with 41% post-operatively, representing a 27% improvement. Intra-operative acetabular component positioning can be achieved using pelvic parameters such as the transverse acetabular ligament or hip computer navigation referenced from the anterior pelvic plane. However, these are static measurements which do not correlate to functional acetabular anteversion during sitting and standing. As hip surgeons, we can well appreciate the importance of getting the acetabular version right. Communication between the spine and hip surgeon is critical to obtaining the best outcome for this difficult to treat patient group, and the failure to understand the change in acetabular version following spinal deformity correction could result in an unexpected THA dislocation.

Hip preservation a success in maintaining cartilage width X-ref

Periacetabular osteotomy (PAO) is gaining considerable popularity despite the significant nature of the surgery, as it is one of just a few options to address deficient femoral head coverage in young patients with hip dysplasia. This technically difficult procedure requires considerable surgical skill and lengthy investment in a significant period of rehabilitation for the patient. Surgeons in **Aarhus (Denmark)** have reported a much-awaited long-term follow-up at ten years reporting the thickness of articular cartilage following a PAO.[6] This prospective cohort study of 26 patients only reports 17 patients at the ten-year follow-up, but is still some of the strongest evidence available on the topic. Unusually, this was an older group of patients, with a mean age of 39 years (range 19-53 years). There were 17 patients completing a repeat MRI at ten years, with three lost to follow-up, three clinically failed and three having had a THA. Within the limits of the MRI resolution there were no differences pre- and post-operatively. The 17 patients with longer follow-up showed an increase in cyst volume in seven; six had a reduction, while four had no cysts. Despite the limitations in this paper, the reduction in cyst size following a PAO is a valuable observation. The results are of course limited by the selection bias as the results of the 25% of the patients having had a PAO with substantial hip pain are not reported! As with all surgical interventions, patient selection is critical to a successful outcome. This is especially important in selecting patients for PAO. Some may argue that patients over the age of 35 years with evidence of acetabular cyst formation is a contraindication to a PAO, and this will undoubtedly have affected these results. However, it is the slightly older patient who may have very early degenerative changes that can be a difficult management problem. Do you go ahead with a PAO and advise them that despite months of rehabilitation and pain from the surgery, it may not work or do you ask them to struggle on until their condition is serious enough for a THA? At present there is no right or wrong answer. Perhaps more

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