

ROUNDUP³⁶⁰

Hip & Pelvis

Amazing alumina goes on and on

■ With the troubled waters metal-on-metal replacements and resurfacings find themselves in it has become a bit of a one-horse race in the hard-on-hard bearing world. Surgeons wishing to use a hard-on-hard bearing in younger patients are now preferring a ceramic-on-ceramic design. Early ceramic replacements were plagued by reports of squeaking and fracture. These problems have not been completely eliminated and many patients still complain of squeaking, which is particularly troublesome for young active patients. Researchers in **Seoul (South Korea)** have examined their results of alumina ceramic-on-ceramic total hip replacements (THR) in patients under 30 years of age. They report a retrospective case series of 62 patients undergoing 75 THRs. They designed their retrospective case series (Level IV evidence) to report outcomes at a minimum of ten years' follow-up, and only included patients under the age of 30. Patients were followed to a mean of 11.6 years and had a mean age of 24 years. The authors used survivorship analysis, and clinical outcomes were assessed using Harris and WOMAC scores. All patients received an uncemented stem and an alumina-on-alumina ceramic articulation. Here at 360 we were reassured by their findings. They reported a 98.9% survivorship with revision for any reason as the endpoint. The researchers were unable to identify any radiological

evidence of osteolysis, although there was abnormal squeaking or clicking in 12 (16%) patients.¹ We were delighted to read such a favourable report surrounding the longevity of the ceramic-on-ceramic articulation in younger patients. This series really does support the practice of using hard-on-hard ceramic bearings in very young hip replacements and has gone some way to allaying our fears that patients with an audible squeak may be heading for early revision. It is not quite all good news though; with nearly one in six patients experiencing abnormal sounds or clicks it would certainly pay to carefully counsel these patients prior to surgery, even if these noises do not appear to translate to early failure.

Dual mobility: stability or excess wear?

■ Dual mobility acetabular components have been available for some years, but surprisingly there is relatively little in the global literature surrounding their use or outcomes. We like an exciting new innovative implant at 360 just as much as the next orthopaedic surgeon, and have always been slightly worried that the lack of literature surrounding these implants might indicate relatively poor adoption, and sometimes this can be due to underlying unreported poor results. Previous attempts at dual articulations with large polyethylene components have resulted in poor clinical outcomes due to huge frictional torques and high rates of adhesive wear. Whilst this may have

been solved by newer cross-linked polyethylene we have yet to come across any sound scientific research to support their use. History tells us that when something seems too good to be true, like the claims for dual mobility cups (larger heads, lower wear, higher stability and wider range of movement), then it usually is. A clinical research team from **Florence (Italy)** saw a gap in the literature with the reasoning that dual mobility cups might be advantageous in acetabular revision, providing the potential for increased stability without increased constraint and the subsequent loosening associated with constrained acetabulae. The research team designed a study to establish the efficacy of dual mobility cups. Their primary outcome measure was dislocation rates, with secondary outcomes of implant survival, functional scores and radiological evidence of osteolysis. The research team designed a prospective cohort study (Level III evidence) including 33 patients operated on over a three-year period with a dual mobility cup. In all cases pelvic reinforcement was undertaken (24 cases with a protrusio cage and nine flanged cups). Follow-up was to a mean of three years and by final follow-up only one patient (3%) had undergone re-revision. There were no cases of dislocation or radiological evidence of osteolysis, component loosening or migration after three years. The functional results were encouraging with mean Harris hip scores rising

from 48 pre-operatively to 86 post-operatively.² Hurrah! we cried at 360, this certainly does sound like a panacea; no dislocations, loosening or implant subsidence. However, sadly, on careful reading of the paper the authors have not demonstrated the dual mobility cup to be superior to the current standard articulation. With no comparison group, and follow-up to a minimum of three years we would not expect to see any prosthesis failure, and cannot really say the new acetabulum is superior to the standard options. Perhaps a further report with case matching to standard acetabular prosthesis and long-term follow-up is required before we will be adopting dual mobility cups as our standard of care for isolated acetabular revision.

Differential or count? White cells and periprosthetic infection

■ We at 360 are often foxed by the confusing literature surrounding the diagnostic value of one test *versus* another. When there is no gold standard investigation it becomes increasingly difficult to ascertain which test is most accurate. Following a flurry of often contradictory literature in the late 1990s and early 2000s the accepted position amongst most arthroplasty surgeons was that most laboratory tests are sensitive, but not specific for periprosthetic infection. However, with the more recent acceptance that synovial WBC and, in particular, neutrophil count, may be as sensitive but more specific for periprosthetic

osteolysis, researchers in **Philadelphia (USA)** have revisited the potential value of serum blood films in the diagnosis of periprosthetic osteolysis, marked against the new gold standard of synovial white cell counts. The study team decided to reopen the peripheral blood film argument by investigating the value of a peripheral blood film and differential in light of a synovial film. Their study included 153 patients having revision knee replacement. The study cohort included 73 patients with confirmed periprosthetic infection. The research team obtained samples of synovial fluid and peripheral blood film for all patients in the study. They performed a WCC and differential on both. The chief finding of the study was a poor correlation between joint fluid and serum for WCC ($R = 0.19$), neutrophil count ($R = 0.31$), and lymphocyte count ($R = -0.22$). The research team have added some considerable weight to their supposition that while synovial fluid analysis has a high diagnostic accuracy (PMN 93% and WCC 93%) however, the same cannot be said for peripheral blood films. The authors conclude that serum WCC analysis does little to improve the accurate diagnosis of periprosthetic joint infection. Based on this paper we are inclined to agree with the authors.³

Cartilage or impingement surgery?

■ There is now a very significant body of evidence demonstrating the efficacy of hip arthroscopy as a treatment for a range of ‘early’ or ‘pre-arthritic’ conditions in both the short and medium term. The value of these procedures to certain groups of patients is without doubt. What puzzles us at 360 is what precisely we are treating, particularly in patients with femoroacetabular impingement and in patients presenting with onset of new pain in a structurally abnormal hip, which has been abnormal (as far as we know) for many years. It seems probable to us that the patients who are most likely to benefit are those with an overt cartilage lesion

or labral tear in addition to their structural abnormality. Researchers in **Melbourne (Australia)** designed a prospective prognostic outcome study (Level III evidence) to establish the factors predictive of outcome following hip arthroscopy. Their study aimed to establish the prognostic value of rim (labral) lesions and focal cartilage deficits on eventual outcomes. They included 560 patients whose outcomes were established using the Harris hip score (HHS) and non-arthritic hip score (NAHS) at 12 months post-operatively. The major finding of this study was slightly counter-intuitive. They noted that hips without degenerative changes had greater improvements in outcome scores. The research team identified that pre-operative score, low cartilage and rim degeneration grade all had a weak predictive value ($R^2 0.24$) for a good outcome. Although the research team identified that hips without degeneration had better improvement in outcomes, the severity of degeneration did not account for the variance in change in outcomes, and many patients with degenerative lesions had improvements in their functional scores.⁴ What perhaps can be best taken from this paper is that outcomes in arthroscopic hip surgery are to some degree determined by the presence of degenerative lesions, which is partly self-evident. However, this study also supports the assertion that cartilage surgery is potentially one of the most valuable parts of arthroscopic hip surgery. If the cartilage lesion determines a poor outcome, better and earlier treatment of these lesions is likely to improve long-term outcomes. We still know very little about the long-term outcomes of hip arthroscopic surgery, with the



total number of ‘relook’ procedures globally reported for hip micro-fracture numbering about 20. More research is definitely required here in an important and emerging area of orthopaedic medicine.

Acetabulum alone or in combination?

■ Treatment of dysplastic hips is fraught with difficulty, particularly in those young adults requiring re-orientation osteotomies. Re-orientation of a previously congruent hip may result in the development of new problems. Surgeons from **St Louis**

(USA) have investigated the value of synchronous peri-acetabular re-orientation osteotomy combined with osteochondroplasty of the femoral head/neck junction to avoid subsequent impingement. They report a comparative cohort

series of peri-acetabular osteotomy on its own *versus* combined with osteochondroplasty of the femoral neck in a prospective two-year prospective comparative cohort study (Level II evidence). They assessed outcomes of hip scores (Harris hip score), radiological outcomes and complications (including the requirement for further surgery). The research team report a comparison of 40 patients who underwent both procedures and 48 who underwent osteotomy alone. Although this was not a randomised trial the authors reported no differences in baseline Harris hip scores (64.3 *versus* 63.2) or pre-operative radiological parameters. The authors found a significant improvement in the alpha angles and head/neck offsets in the combined operative group. Although not significant there was a higher re-operation rate in the osteotomy alone group (4 *versus* 1).⁵ Although this study is not conclusive due to the relatively small numbers

involved, we would congratulate the authors for a well conducted study with a clear message that combined femoral neck osteochondroplasty can improve radiological outcomes, and may reduce the requirement for further surgery. With rare conditions, therapeutic studies such as this are invaluable in pushing forward surgical management.

Cementless ceramic goes on and on and on... or does it?

■ There are many factors to consider when advising patients as to which hip replacement and which articulation is best for them. Even if every study was set up perfectly and every patient returned for their follow-up appointment, advising young patients about long-term outcomes is, by necessity, at least ten years out of date. Often neglected, the 20-year follow-up is becoming more crucial as patients are becoming fitter, living longer and having more active lives into their 70s and 80s. Researchers in **Lodz (Poland)** report mean 19.8-year (minimum 12.4) follow-up of the Mittelmeier cementless hip. The research team enrolled 188 patients (220 replacements) in an ongoing follow-up study. The patients were a young cohort (mean 44.5 years) who all underwent surgery for degenerative hip disease. As would be expected in a cohort this young the majority of surgery was performed for dysplastic and post-traumatic degenerative change. Patients were followed up using the scoring system of Merle d’Aubigné. The authors report good or excellent clinical results in 83.1% of patients and a 12-year survival of just 86.3%.⁶ Although the surface treatment of femoral and acetabular components are no longer in use the results of the alumina ceramic-on-ceramic articulation are highly relevant to current orthopaedic practice. The high rate of failure seen here is typical of the ‘fit and fill’ femoral components with large holes for ingrowth such as the Mittelmeier stem. Unfortunately, due to the 14-year period which the operations took place over it is not really possible from

the data presented to draw long-term conclusions about the alumina articulation, or any message that may be relevant to more modern articulations, as sadly the authors have not included their complete Kaplan-Meier analysis, simply reporting the results at the 12-year time point. An opportunity wasted, we feel.

Metal-on-metal: the last word?

■ We are probably very far from the last word in the saga of metal-on-metal hip resurfacing, however, we are fairly certain here at 360 that it is unlikely that a bigger series will be reported than that reported by part of the National Joint Registry group in **Bristol (UK)**. The research group investigated the outcomes of patients registered on the UK National Joint Registry between 2003 and 2011. In total 434 560 total hip replacements (THR) were included as part of this registry study. Of these, 31 932 were resurfacing arthroplasties. The results were stratified by gender and size of articulation prior to comparison with the summed THR results. The research team used a modified survival analysis (flexible parametric survival models) to estimate incidence of revision surgery while allowing for the competing effect of death. The results for men and women differed dramatically. In women the resurfacing performed more poorly than the THR, irrespective of head size with five-year revision rates almost over five times that of the THR in the smaller head sizes (8.3% 42 mm resurfacing *versus* 1.5% 28 mm THR). The situation was different in men, with the smaller heads

again performing worse than the THR (4.1% 46 mm five-year revision rate *versus* 1.9% 28 mm THR) but the larger sizes have comparable revision rates (2.6% in 54 mm heads).⁷ The researchers have not made any new observations, but have reinforced previous reports of similar higher failure rates in some patient subgroups. However, although powerful as this is national registry data, we would again inject a note of caution. Resurfacings (like THRs) do not all have the same failure rate, and it is likely that the results are skewed by some prosthesis with unacceptably high revision rates. It is also the case that there will be a significant element of selection bias as with any registry paper or case series. Nonetheless, despite our slight reservations about some aspects of the methodology and a note of caution that revision of a resurfacing may not be as significant an event as revision of a THR, we believe here at 360 that this paper nicely confirms the risk factors previously identified.

Does size matter in failure?

■ Picking out the best implant for your patient is more challenging than it might first seem. Different stems can be mated to different acetabular components. Implants of the same name have often undergone multiple iterative design changes and different-sized components often have different geometry. Although beloved of examiners in boards and FRCS exams, do all of these little changes actually matter in a hip replacement? Is the 'winning' design so sensitive to small changes that real differences in survival will

actually be seen? Researchers from the **National Joint Registry (UK)** set out to answer the question using the most successful (and popular) design recorded on the UK joint registry. The UK joint registry is an ongoing outcomes audit, and the research team used retrospective analysis of prospectively collected data. The research team included 34 721 patients, all of whom received an Exeter/Contemporary cemented articulation. The acetabular component comes in a hooded and flanged variety and in a range of head sizes. Statistical analysis with a proportional hazard model was undertaken to establish the impact of patient, surgeon and implant variables on the seven-year failure rate. The risk of revision in the whole cohort was 1.7% at seven years. The proportional hazards model revealed that risk of revision was significantly higher with the hooded acetabulum (HR 1.88) in smaller head sizes (< 28 mm HR 1.50). Interestingly, the risk of revision was independent of all other patient and surgical factors, including use of alumina heads and stem size. When dislocation was taken as an endpoint patients with larger modular components and hooded cups had a higher dislocation rate.⁸ It does appear from the data presented here that apples are not always apples, and that these small iterative changes and new 'models' of established implants may have more of an effect on failure rate than we are led to believe. This highlights the difficulties of innovation in a market where longevity and 'tried and testedness' are the most prized characteristics.

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