

ROUNDUP³⁶⁰

Hip & Pelvis

For other Roundups in this issue that cross-reference with Hip & Pelvis see: [Knee Roundup 5](#).

Young and impinging

■ The connection between hip impingement and osteoarthritic change is starting to be widely accepted, however, there is yet to be proof of cause and effect despite some large ongoing prospective observational series. There is a known high incidence of radiographic femoroacetabular impingement in the normal asymptomatic population, which raises questions concerning the validity of the proposed relationship between FAI and OA of the hip. There is no question that early degenerative changes are found in many FAI patients, but does it really eventually lead to end-stage OA? Researchers in [Rockford \(USA\)](#) turned the question on its head in an ingenious little study. Reasoning that if FAI really is a risk factor for OA of the hip, early patients presenting young for total hip replacement (THR) should have a higher incidence of the signs of FAI than older patients presenting for the same operation. The canny researchers at Rush University designed a retrospective comparative cohort study (Level III evidence) to compare the incidence of radiographic signs of impingement in the under-50s *versus* the over-50s presenting for THR. The research team identified 50 patients in each group from the institution's arthroplasty records. Patients with a history of dysplasia, inflammatory arthroplasty, hip trauma or osteonecrosis were excluded from

the study. The radiographic records of both cohorts of patients were examined for radiographic signs of FAI by independent observers and both intra- and inter-class correlation coefficients calculated. The intra- and inter-observer reliability was calculated to assess reliability of the radiographic analysis. There were significantly more male patients, patients with decreased medial joint space, as well as greater alpha, tonnis, centre-edge and sharp angles in the younger cohort. The chief finding of this study is that there is a higher incidence of cam deformity in younger patients undergoing total hip replacement than in older patients.¹ This paper indirectly supports the relationship between FAI and THR, with the findings of an increased prevalence of FAI in the younger cohort. However, it is important to remember that an alternative explanation may lie in either age-related remodelling of the proximal femur (which is well described) or a degenerative process described by other authors that does progress from lateral to medial.

Clothes, weather and femoral heads?

■ The eagle-eyed editorial board of 360 keep apace with over 50 journals each month, ferreting out the most useful and relevant articles for orthopaedic surgeons the world over. We couldn't help but include this article from anatomists in [Canberra \(Australia\)](#). It is well known that the geometry of the proximal femur varies both between patients and with age as continuous remodelling

occurs across the adult skeleton. However, what is not completely clear is what factors influence these changes. Researchers aimed to establish some of the factors that may contribute to changes in proximal femoral geometry using the femoral neck shaft angle (NSA) as a surrogate marker for overall neck geometry. The research team assembled a global 'neck shaft angle' database including over 8000 human femora from 100 different demographic groups. They analysed a range of potential factors contributing to variation, including demographics (sex, age, size), climatic adaptation, and activity patterns. The team identified a mean NSA of 127°, which is lower than the accepted 135°. Their paper suggested that there were in fact no age- or sex-related changes. They did note that NSA varies with climatic variation; in warmer regions it is 130° where lower values are seen in colder regions (associated with the stocky build often seen in these areas). There are some changes seen towards an increasing NSA as individuals transition up the economic tree from forager to agricultural worker and then on to urbanisation. Perhaps the most interesting assertion from the authors of this study is the narrowing range of NSA seen as time progresses which is, they suggest, due to climatic 'buffering', i.e. the wearing of clothes!² Whilst of general interest to our readership here at 360, we think this is a fascinating article. It is widely accepted across the orthopaedic community

that there are well characterised age-related changes that occur as the patient ages. If we have it wrong in orthopaedics then our implants, particularly trauma and arthroplasty designs, may need revisiting. We haven't noticed a sudden rash of DHS we couldn't implant, or hips with abnormal geometry surgically, and we wonder in fact if it is the anatomists who may be wrong?

Go long, go cemented

■ The treatment of metastatic disease in the hip is becoming ever more common, and the widely accepted principles of 'augmented arthroplasty' with long stems and, where appropriate, multi-hole acetabular shells are widely accepted. The use of cement in these patients remains, however, controversial on both sides of the articulation. Long cemented stems have an excellent track record in revision arthroplasty and are not reliant on either bone ingrowth or a stable distal fixation. However there is the potential for increased intra-operative complications (particularly cement and tumour embolus) during pressurisation. Surgeons in [Salt Lake City \(USA\)](#) designed a simple study to establish whether cemented long stem femoral components are indeed safe to use in patients with femoral metastasis. The team designed a retrospective case series (Level IV evidence) with the aim of establishing the rates and types of intra-operative complications and early post-operative complications associated with cemented femoral

stems. The study team included 44 arthroplasties performed in 42 patients. All patients underwent meticulous surgery from a senior surgeon to implant a cemented long femoral stem. The authors reviewed intra-operative complications including cement-associated desaturation, cement-associated hypotension, sympathomimetic administration, post-operative hypotension/desaturation, and death. Of the 42 patients, 19% developed cement-associated hypotension and of those, nearly 50% required adrenergic support. There were two patients in whom prolonged intubation was required and a single in-hospital death. However, there were no cardiopulmonary events in the peri-operative period.³ Although a relatively small series, the authors conclude that the surgery can be performed safely with a low risk of cardiopulmonary events. Although a 19% rate of hypotension is worrisome, this must be taken in context. Instrumentation of the femur in patients with tumour (even intramedullary nailing and uncemented arthroplasty) carries with it the risk of hypotension from fat and tumour emboli. The difficulty we have, here at 360 HQ, in making sense of this particular paper is it does not tell us if these events are more frequent with a cemented or cementless stem.

Surgical repair of the abductors?

■ Treatment of all pathologies round the trochanter (trochanteric bursitis, fascia lata syndrome and abductor tears) is fraught with uncertainty and disappointment. Patients present with genuine symptoms requesting treatment, but the literature and expert opinion is conflicting on the efficacy of surgical intervention. Injury to, or interruption of, the gluteals as part of an evolving trochanteric bursitis is associated with pain and functional impairment with a Trendelenburg gait. Reasoning that although surgical options are controversial, that when there is evidence of an abductor tear the patients

are likely to benefit from surgical repair, researchers in **Aurora (USA)** embarked on 23 surgical reconstructions of the abductor complex and have reported them as a retrospective case series. In all cases patients presented with chronic lateral hip pain associated with a Trendelenburg gait and were followed up for a minimum of five years. Patients were evaluated with MRI scans, and if there was a discontinuity in the abductor tendons they were offered reconstruction. Surgical exploration included definition and isolation of the tear and characterisation of partial thickness and under surface tears. Patients presented with a mean Harris score of 53 points pre-operatively which improved to 87 points post-operatively, and 88 points at five years. There were no significant differences based on severity of the abductor tears or pre-operative weakness, however, the three patients who reported being unsatisfied with their results had complete large tears. Limb activity improved from 6.7 points pre-operatively to 8.9 post-operatively, as measured by the Lower-Extremity Activity Scale.⁴ Although 'just a case series' these authors have established quite clearly that in patients where there is an abductor tendon avulsion or tear, following careful evaluation patients can successfully undergo surgical repair.

Aspirin for DVT prophylaxis?

■ Despite millions spent, publicity campaigns, and who knows how many scientific articles, it is not clear what the most effective, and cost-effective, thromboprophylaxis regime is following total joint arthroplasty. This lack of clarity is chiefly due to political and commercial interests, clouding what should be a simple

issue; what is the best prophylaxis and how long to take it for? Despite the complete lack of clarity surrounding the issue, the accumulated knowledge surrounding adverse events, treatment effects and likely risks for DVT and PE are well characterised in different patient groups. A slightly different take on the long-running argument has been used by a health economics team in **Minneapolis (USA)**. They have set out to apply a health economics model (Markov cohort model) to the problem in an attempt to establish lifetime costs,

quality adjust life years (QALYs) and cost per QALY for both aspirin and low-molecular-weight heparin when used as thromboprophylaxis following total hip or knee replacement. The model used allowed the researchers to account for a range of post-surgical health states including the likely development (and health impact) of post-phlebotic limb and intracranial haemorrhage. The model was used to estimate QALYs in patients of differing ages and 14 days of prophylaxis was modelled in each treatment group. The research team used \$ 100 000/QALY as their cost-effectiveness threshold. In younger patients, low-molecular-weight heparin was the most effective treatment, although the costs/QALY did not reach the cost-effectiveness threshold, with a cost of \$315 000/QALY in patients aged 55, and \$1.4 million/QALY in patients aged 70 years. In older patients (aged 80 or 85) aspirin was more cost effective.⁵ The authors conclude that for patients with no history of venous thromboembolism, aspirin is a cost-effective choice for venous thromboembolism prophylaxis following total hip arthroplasty. The choice is slightly more complex when

it comes to knees with younger patients potentially benefitting from heparin therapy.

Ceramic-on-polyethylene: a low wear solution?

■ The controversy surrounding the two most commonly used 'hard-on-hard' bearings, metal-on-metal and ceramic-on-ceramic with particular concerns of metallosis and squeaking, respectively, has re-awakened interest in the hard-on-soft bearing combinations. Tried and tested metal-on-polyethylene has a predictable wear profile with almost universal survival rates of well over 95% at ten years. With the advent of newer cross-linked polyethylene and the ability to mate this to ceramic heads there is the attractive prospect of lower wear without the added risks of the hard-on-hard bearings, perhaps the best contemporary solution for young or high demand hip replacement users. There is, however, a lack of *in vivo* studies (although cadaveric retrievals do exist) out to long-term follow-up quantifying the wear characteristics of ceramic-on-polyethylene. Researchers in **New York (USA)** report a prospective case-matched series (Level II evidence) of young patients undergoing metal-on-ceramic arthroplasties. There were 31 patients who were matched by age, sex, BMI, activity level and diagnosis. The cohort were on average 55 years old and all underwent a posterior approach total hip arthroplasty with a Harris-Galante-II acetabulum and a Ranawat-Bernstein femoral component. A conventional polyethylene liner was mated to either a cobalt-chrome or alumina ceramic 28 mm femoral head. Wear was assessed using the EBRA method with Roman software. The patients underwent 15 years of prospective follow-up with outcome measures of Hospital for Special Surgery scores (HSS), UCLA activity levels and calculated wear rates. Patients underwent an average of 17 years' follow-up and there were no significant differences in metal and alumina groups with



respect to Harris hip score (39 and 40 respectively) or UCLA activity levels (6 in both groups). There were significantly lower wear rates in the ceramic head group, with only 58% of the wear seen (0.05 mm/year vs 0.086 mm/year). Although the difference was not statistically significant, three metal-polyethylene patients required re-operation for wear-related changes, whereas only a single patient did in the ceramic-polyethylene group.⁶ We were delighted to read this well-constructed paper that sets out to characterise the differences the change to a ceramic modular head can make. The single change of articulating surface is demonstrated to produce vastly reduced wear debris, perhaps the bearing of choice for those wary of adverse reactions from metal-on-metal articulations and ceramic wear debris.

ALVAL and ASR™: the story continues

■ The ASR™ prosthesis has been the subject of much media and academic coverage. Due to the high rate of adverse metal debris responses observed and high failure rates reported on a number of world registries, DePuy have withdrawn the prosthesis from commercial sale. Despite this withdrawal from the market there is surprisingly little data surrounding the actual prevalence of adverse metal debris responses in this population of patients. Similarly little is known surrounding the specific risk factors for adverse metal debris-associated responses. Surgeons in **Tampere (Finland)** reviewed all of their small headed ASR™ prostheses and the ASR™-XL

metal-on-metal hip replacements. The surgeons had undertaken 482 ASR™ arthroplasty procedures, and following withdrawal of the prosthesis established a screening programme, the results of which make up the basis of their report. By just short of five years post-operatively, they had been able to follow up 435 hips with clinical evaluation, serum cobalt and chromium levels and cross sectional imaging. At their final follow-up around a third of hips had been revised (34%, n = 162/482), with over 85% of these revisions associated with adverse metal debris reactions. The problems were far more marked in the ASR™ XL THA with a seven-year survivorship of just 38% (as compared with 51% for the ASR™ small head group). Like other researchers, this group identified reduced coverage as an independent risk factor for adverse reactions, along with high pre-operative ROM, use of the Corail® stem, and female gender.⁷ While many have written off the ASR™ as an unfortunate episode in history and many more surgeons are shying away from the use of all-surface replacement or metal-on-metal technology, a thorough examination of the failure mechanisms is important. Both prostheses are clearly catastrophic, however, it is marked how much higher the failure rate in the THR-based ASR™-XL is. The exact reason for this is far from clear. If it were just 'trunnionosis' why are high rates of metal debris responses not seen with all modular prostheses? This is a puzzle it is essential to get to the bottom of to avoid similar problems in future prostheses.

Salvaging Legg–Calvé–Perthes' disease

■ Whilst Legg–Calvé–Perthes' (LCP) disease is a relatively common disease, there is surprisingly little literature surrounding the difficulties of late salvage with total hip replacement in middle age. Surgeons at the Mayo Clinic in **Rochester (USA)** have written up their experience of nearly 100 such arthroplasties. The team reported their experience with the aim of establishing the longevity of, and risks associated with, total hip replacement (THR) in patients with a previous history of LCP. Their surgical experience stretched to 99 primary THRs in 95 patients, all with a minimum of two years' (mean eight years) follow-up. Patients were aged on average 48 at the time of primary arthroplasty and during the duration of the study there were ten revision surgeries performed. Survival analysis gave slightly differing survivals for cementless (90% at 8 years (95% CI 76% to 96%)) and cemented (86% at 8 years (95% CI 57% to 96%)) prostheses. As would be expected there was a significant improvement in the Harris hip score (of 31 points) with complications occurring in 16% of hips. These were not insignificant complications, with nine intra-operative fractures (eight femoral, one acetabular) and three sciatic nerve palsies (associated with a mean 2 cm leg lengthening).⁸ Whilst the reported survival of these prostheses was excellent, it is surprising to us here at 360 just how many intra-operative complications these patients suffer. There is no doubt that at a centre like the Mayo Clinic this represents a difficult patient popula-

tion, not poor surgical technique. It is also clear that care must be taken not to lengthen the patients' legs. Under normal circumstances 2 cm of lengthening would not be associated with a sciatic nerve palsy. Clearly the tolerances are a lot lower in patients who have a history of LCP.

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