

ROUNDUP360

Hip & Pelvis

X-ref For other Roundups in this issue that cross-reference with Knee see: *Knee Roundup 1; Trauma Roundups 5, 6; Children's Orthopaedics 1, 3, 7; Research Roundup 3.*

Hip failure in alumina ceramics

Historically there have been considerable reservations in using ceramic femoral heads in total hip arthroplasty because of concerns regarding trunnionosis, limited head and neck length options as well as the risk of implant fracture. However, with manufacture and design improvements addressing these concerns, ceramic heads are now used in up to 50% of implanted femurs. Perceived benefits of using ceramic femoral heads on highly cross-linked polyethylene include improved wear rates, and reduced risk of corrosion and fretting at the head–trunnion interface. However, there are some in the orthopaedic community who continue to be concerned regarding the risk of fracture, although all previous studies that have attempted to address this issue are single-centre reports with relatively small numbers. This study from **Philadelphia, Pennsylvania (USA)**¹ is extremely helpful as it reports the outcomes of around six million patients. The authors' aim was to determine the fracture rate of modern alumina-pure alumina (PA)- and alumina matrix composite (AMC/Biolox delta) ceramic heads, and to identify the factors which may influence fractures. The authors used the manufacturer's own database, which was the result of a directive from the

regulators requiring the reporting of device-related adverse events. As CeramTec (Plochingen, Germany) provide over 90% of all ceramic components to major orthopaedic suppliers, this is a comprehensive, if potentially biased, study. Between 1 January 2000 and 31 December 2013, over 3.2 million PA and 2.78 million AMC femoral heads were implanted. During this period there were 672 PA femoral head fractures (0.0201% or 1 in 5000) compared with 28 AMC head fractures (0.0010% or 1 in 100 000). In addition, since the year 2000 the number of reported fractures has decreased. The fractures tended to occur at an early stage following implantation, with 80% of the PA heads occurring within 48 months and 90% within 72 months. Fractures tended to occur following trauma, hip dislocations and component malposition, although the data on this issue were not comprehensive. In addition, the authors highlight that smaller-diameter PA heads were more likely to fracture, compared with larger heads (28 mm vs 32 mm). There were no reported fractures in heads of 40 mm in size. A short-taper 28 mm PA head was more likely to fracture when compared with any other 28 mm heads on any other taper. The authors demonstrated that taper designs and mismatch was the principal cause for fracture attributed to the majority of the AMC heads, and taper debris or contamination was often found in the PA head fractures. While there are drawbacks to this study design, with suggested under-reporting to the manufacturer of ceramic fractures, the lessons learned from those heads

that did fracture remain valid. This study is the largest reported to date on ceramic femoral head fractures over a 15-year period and I would commend all hip surgeons to review its findings, particularly when most manufacturers will provide ceramic heads at no additional cost, albeit the PA variety!

Metal allergy: a genuine determinant of outcomes?

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As increasing numbers of total joint arthroplasty (TJA) patients are reporting metal allergies, it is important to determine if this self-reported allergy has any impact on patient outcomes. The basic science data would suggest that there is no immune reaction in the majority of patients to implantation of metal, as the mechanism for the most common metal allergies is one of contact dermatitis with activation of an IgM-mediated pathway, not often seen in the peri-articular tissues. This study from **St. Louis, Missouri (USA)** sets out to establish if there is, however, a link between patient-reported metal allergy and TJA outcomes.² Their study concerns the outcomes of elective TJA over a three-year period. The authors recorded the University of California at Los Angeles Activity, Short Form 12 (SF-12), Modified Harris Hip, and Knee Society scores as appropriate, along with patient-reported incidence of metal allergy. The results of 960 primary total hip arthroplasties (THA) and 589 total knee arthroplasties (TKA) form the basis for this report. The authors demonstrate an increasing frequency of metal allergy reporting (1.7% prior to

January 2010 and 4.0% afterwards). Perhaps surprisingly, there were no differences in patient-reported outcomes with THA; however, there were significant differences in the results of TKA. Self-reported allergy patients had decreased function, symptoms, satisfaction and expectation. What is interesting about this finding is that these outcomes are independent of the implants used. Thus, the use of 'non' metal implants may not improve outcomes, and this perhaps suggests that the report concerns metal allergy alone, rather than that contact with the reported allergic metal may affect outcomes. To truly unpick this thorny issue a large series of patients with contact allergy testing would be needed, but we do wonder if this is associative rather than causative, especially given the reported differences in the mental health component of the SF-12 between the metal allergy sufferers and non-metal allergy sufferers.

Bundling care in arthroplasty

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In those parts of the world with a very large state-funded healthcare system, the concept of bundled payments is nothing new – where remuneration is given for the 'episode of care' rather than for the individual components of this episode. Care bundles offer subtly different approaches, with some including all components of treatment but covering costs of complications, and others failing to cover, or even (as in some procedures in the UK) reducing payments for failure to reach quality metrics or withholding payment if there is a readmission or



complication. Bundled payments are increasingly being implemented in total joint arthroplasty across the world, and this study from **Philadelphia, Pennsylvania (USA)** specifically examines the 'fairness' of such a system in total hip arthroplasty.³ In the US the use of bundled payment models, such as the Comprehensive Care for Joint Replacement Model, set out a price for performing a certain procedure, but do not take patient characteristics into account. This study highlights the following demographic factors as being more costly: advanced age, increasing BMI, cases performed for fractures, elevated ASA grade, and major complications. In the future, bundled payment programmes should take these demographic factors into consideration and pay a higher amount for specific patients.

Bariatric surgery helpful prior to hip arthroplasty

■ There is controversy over the risks, benefits and funding for arthroplasty in the elderly. One of the unanswered questions, however, is about the optimisation of patients, and in the case of this study from **Rochester, Minnesota (USA)**, whether weight loss surgery reduces the risks enough to warrant the increased costs.⁴ There is now good evidence to suggest that a high BMI is associated with an increased risk of wound complications, periprosthetic joint infection (PJI), hip dislocation, re-operation and revision following total hip arthroplasty (THA). Bariatric surgery is capable of reducing BMI, and there are established

benefits with improvements in diabetes mellitus, hyperlipidaemia, hypertension and sleep apnoea. Despite these benefits, the evidence currently suggests that patients undergoing total knee arthroplasty (TKA) after bariatric surgery actually do worse, but there is little to no evidence to support its use or otherwise in THA. The authors report a total of 137 obese patients, 47 of whom underwent a THA having had previous bariatric surgery, and 90 patients who underwent 94 THAs who had not had bariatric surgery. The mean age of the patients was 57 years in both groups. The mean time between bariatric surgery and THA was five years (4 months to 12 years), during which time the mean BMI improved from 49.7 kg/m² to 35.3 kg/m². The BMI in the comparison group (who did not have prior bariatric surgery) was 50.2 kg/m². Patients who did not have bariatric surgery before THA were statistically more likely to require further surgery and revision than those who did have pre-operative bariatric surgery. The most common reason for revision in both groups was PJI. A number of other studies have shown little evidence to support the authors' conclusion that bariatric surgery should be considered prior to THA in morbidly obese patients. However, the reason these patients are at high risk of complication is not just their weight but also their additional comorbidities including nutritional and protein deficiencies. These deficiencies may not be addressed with bariatric surgery and in fact may be exacerbated, which may explain why some studies have shown poor outcomes of THA and TKA following bariatric surgery. Patients who lose a lot of weight following bariatric surgery have poorly organised collagen structure, and together with elastic degradation this can lead to increased incidence of arthrofibrosis and instability after a TKA, for example, making soft-tissue balancing a challenge. This is an interesting study, with some weaknesses, that

highlights the difficulty in managing patients who are morbidly obese with degenerative joints. This study also highlights the fact that the high incidence of further surgery and revision following THA in morbidly obese patients is multifactorial and that patients' nutritional status and the effects of weight loss on the soft-tissues also need to be considered.

Bariatric surgery – another take X-ref

■ In the current clinical climate of potential rationing for overweight patients, this meta-analysis from **Norwich (UK)** throws an interesting curve ball as it questions the benefit of bariatric surgery for arthroplasty patients.⁵ The authors conducted a systematic review and meta-analysis. Though they describe the evidence base as 'moderate' in their review, one does have to question that assertion given the lack of randomised trials and inclusion of studies with registry fidelity data. The authors conclude that there are no differences in complication rates, although they do show a potential benefit in superficial wound infection (95% CI 0.95-0.37 RR 1.88); this is reported as non-significant in the paper. Estimating event rates precisely in a heterogeneous population is always difficult. The previous paper would suggest that perhaps hips, and not knees, benefit from weight loss surgery. There is also the difficulty in picking out what exactly constitutes weight loss surgery, and the eventual BMI and initial BMI obviously have some potential implications for the results of this approach. Here at 360 we are left convinced that more work needs to be done on this topic, but not convinced (or otherwise) as to the benefits of weight control surgery.

Long-term success of two-stage arthroplasty revision X-ref

■ Two-stage revision exchange procedures are considered the 'gold standard' in many centres for treating a chronic established

periprosthetic joint infection (PJI). Although more recent literature has suggested that in some cases a single-stage revision should be enough, there remains some debate on the relative risks of a less aggressive approach. With a success rate reported to range between 72% and 100%, two-stage revision procedures remain the most successful. The variation can be accounted for by risk factors such as negative cultures, methicillin-resistant organisms and increased re-implantation operative time. Surgeons in **New York, New York (USA)** report their own experience of two-stage revision in which they sought to determine the recurrence rate among patients with chronic hip and knee PJI treated with two-stage exchange arthroplasty, as well as to establish the risk factors for infection recurrence and for developing persistent *versus* new infection.⁶ The authors retrospectively identified a sizeable sample of 548 patients with late chronic hip or knee PJI, all of whom were treated with a two-stage revision procedure between January 1998 and March 2014. Of this cohort, 48 (8.8%) had a recurrent infection. Risk factors associated with recurrent infection included sex (males had 54.8% lower odds) and heart disease (109% higher odds). Risk of infection recurrence also increased in patients with psychiatric disorders (119% higher). Finally, patients with recurrent knee PJI had 84.6% lower odds of persistent infection compared with hip PJI. It is clear that, as with primary and other forms of secondary osteomyelitis, there is a significant effect of host factors here. One of the difficulties has always been in teasing these things out and the need for relatively large samples (such as in this study) of what is a comparatively rare condition. The surgical approach should clearly be tailored to vary the aggressiveness of the approach according to the patient host factors and the organism. There is nothing revolutionary here, however, a clear delineation of patient and organism risks in a large

series is certainly helpful.

Aspirin and thromboprophylaxis X-ref

■ Authors from **Brighton (UK)** have turned the evidence-based spotlight on the venerable old aspirin as a thromboprophylactic agent.⁷ Recommended by national guidance in some healthcare systems but not in others, aspirin is widely seen by the surgical fraternity as providing a potential balance between the risks of thromboprophylaxis and the risks of thrombosis. The study team identified 13 studies presenting data eligible for inclusion, the bottom line being that the only trial of high-quality evidence within the systematic review demonstrated aspirin to be equivalent to other forms of chemical thromboprophylaxis. This finding, of course, is in line with the registry study data. The authors comment that while other included studies show a mixture of superiority or

inferiority, there are methodological problems with all of these studies, rendering their results low-quality evidence with a severe risk of bias. We would agree with the authors' conclusion that further studies are definitely required to establish the safety and effectiveness of aspirin – perhaps a topic for a future large-scale randomised controlled trial.

Lower birth rate in patients with total hip arthroplasty

■ As patients with arthroplasties are becoming somewhat younger and parents are becoming somewhat older, a question that John Charnley would perhaps not have foreseen is answered by researchers in **Tampere (Finland)**: does having a total hip arthroplasty (THA) have an effect on birth rate?⁸ Using the Finnish national registry, the investigators compared the birth rates of 5863 patients who had undergone THA while of child-bearing age (between 15 and 45 years

for women and 15 and 50 years for men) with a matched cohort on a 3:1 matching basis. Though a simple study, the authors reveal an interesting finding – the birth rate following THA was between approximately 20% and 60% lower in the male and female patient groups. Once adjusted for potential confounders, there was still a significant reduction in birth rate (male HR 0.80, female HR 0.56).

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Knee

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Early discharge not associated with complications X-ref

■ With improved anaesthesia and pain control modalities after total joint arthroplasty, hospital length of stay has decreased over time. This has become a focus of healthcare funders and patient groups alike, with shorter lengths of stay purportedly associated with reduced costs and increasing satisfaction. However, opponents to shorter hospital length of stay argue that the benefits may be lost with patients being discharged too soon hiding a burden of later re-admission, complications and poorer outcomes due to a failure to recognise early complications. Researchers in **Montreal, Québec (Canada)** have reported their large

database study which was designed to answer some of these questions.¹ Their study was undertaken using the National Surgical Quality Improvement Program (NSQIP) database with the aim of establishing the effects of a reduced length of stay on total joint arthroplasties. They report the outcomes of 31 044 total knee arthroplasty (TKA) patients and 19 909 total hip arthroplasty (THA) patients. Outcomes reported included length of stay, re-admission and incidence of major complications. The study team divided the cohort into non-admission to two-day admissions, and two or more day admissions, with a multivariable model being used to assess the effect of length of primary stay on these outcomes. The authors demonstrated fairly conclusively that, based on the NSQIP dataset, hospital discharge at less than two days for TKA was not harmful, and that in terms

of complications and re-admissions it was actually protective in THA patients. This adds to the body of evidence that discharge within two days does not increase complication or re-admission rates, and that in the USA Medicare should consider revisiting their three-day hospital stay rule.

Complex primary total knee arthroplasty

■ Every primary total knee arthroplasty (TKA) patient is different and, perhaps more so than in any other joint arthroplasty, primary knee replacement can require significant reconstruction of bone defects and some use of 'revision' implants. In some of these more complex cases there are times when increased constraint is necessary to achieve stability in a TKA. Little is really known about these complex primary joint arthroplasties where increasing constraint is used 'from the off'. Using their own arthroplasty

register, surgeons from The Mayo Clinic, **Rochester, Minnesota (USA)** describe the outcomes of their 'constrained primary' knee arthroplasties.² From a population of 28 667 undertaken over a 44-year period, just 427 patients received a constrained primary knee arthroplasty while 246 were given a rotating-hinge arthroplasty. Their analysis of survival took into account age, sex and BMI, and outcomes were reported by cause of re-operation or revision. There was (as would be expected) a reduction in all-cause survival at ten and 20 years associated with increasing constraint. There was an increased hazard ratio of revision for both the constrained group (1.74) and rotating-hinge group (2.07). This picture was slightly different in patients when component revision was taken as an endpoint with the rotating hinge performing better