

ROUNDUP³⁶⁰

Hip & Pelvis

Failure in metal-on-metal arthroplasty

■ The debate, both clinical, scientific and now legal, continues unabated concerning metal-on-metal articulations in hip arthroplasty. It is widely accepted that the diameter of the femoral component affects the achievable radial clearance in the manufacture process, which in itself affects the likelihood of thick film lubrication and hence metal ion release. The use of a larger diameter bearing potentially has the advantages of increasing the stability and reducing the wear rate. Higher failure rates with smaller prostheses have been clearly demonstrated in resurfacing arthroplasty but there are few reports concerning how this relationship changes between large head (where there is a second trunnion interface) and resurfacing arthroplasty. Researchers from **Wollstonecraft (Australia)** used the Australian joint registry data to establish the potential effect of head size with the same metal-on-metal arthroplasty (Birmingham) using the resurfacing and large head THR options. The Birmingham resurfacing has consistently shown the best outcomes of any metal-on-metal resurfacing and, although the overall revision rate is significantly higher than other options in the majority of joint registry reports, continues to be actively marketed and implanted. The Birmingham arthroplasty system has the same overall survivorship in the Australian registry whether used as a resurfacing or as a modular large head revision system. The authors

performed a subgroup analysis to establish if the relationship between head size and survival was valid in a population study and across both cohorts of patients. The results were really quite interesting. The relationship between small heads and failure of the Birmingham resurfacing held true (with head sizes smaller than 50 mm there is a significantly higher risk of failure), but, interestingly, the small head size arthroplasties had a significantly better survival than the larger ones. The most successful groups (small THR and large resurfacing) had no significant differences between them in terms of outcomes, and in both cases the 'watershed' point appears to be at about the 50 mm diameter.¹ It is difficult to make sense of these results in light of what is known about the basic science and tribology of the implants. However, we would venture that perhaps given the known association between 'trunnionosis' and failure in large head metal-on-metal arthroplasties, the larger head size in the stemmed implants places more torque force on the trunnion and this may exacerbate that effect. Given the political minefield that metal-on-metal arthroplasty has become, some of these important issues need resolving.

Minimal hip, minimal trouble?

■ 'Mini' hip approaches are a fashion that, like flares, seems to keep coming in and out of vogue. With the advent of hip navigation providing a potential important 'safety assurance', and the increasing

demands of younger more active patients, a small approach with little soft-tissue damage does certainly seem like an attractive option. The popularity of the 'mini-Watson-Jones' and 'mini-Smith-Peterson' approaches seems to have grown over the past few years. The Watson-Jones, particularly, offers the attraction that there is the potential for lower post-operative complication rates. The approach relies on the interval between the tensor-fascia-lata (TFL) and is therefore an intermuscular (and internervous) plane. However, there is potential for injury to the superior gluteal and lateral cutaneous nerves. A research team in **New York (USA)** designed a study to establish the potential for injury to the innervation of the TFL when using the mini-Watson-Jones approach for THR. The investigators designed an MRI follow-up protocol which allowed for accurate visualisation of the TFL and quantification of any signs of fatty degeneration in the muscle itself. A total of 26 serial patients underwent THR and were entered into the study. Each received a post-operative MRI scan (at around nine months) and the scans were analysed for signs of muscle denervation (atrophy or hypertrophy and fatty infiltration). The research team established that around three quarters of patients exhibited some form of muscle denervation and that over 40% had signs of fatty infiltration on their MRI scans.² The jury is still very much out on the benefits of minimally invasive hip surgery, but this

paper certainly won't add weight to the proponents' arguments. The aim of minimally invasive surgery is to preserve function and minimise soft-tissue damage. If, in 75% of patients, the TFL is damaged, that does not seem to be the case. However, like so many of these studies, without a control group of patients undergoing regular THR it is impossible to say if the changes noted are more or less than would be expected with traditional surgery. The jury is most firmly still out.

Do bisphosphonates improve femoral bone stock following arthroplasty?

■ One of the unwanted effects of total joint replacement is the relative unloading of the proximal femora and subsequent resorption of the proximal femoral bone stock. Modern THR components are designed to maintain proximal femoral bone stock through maximising proximal femoral loading, either through a double taper with taper slip designs, or through maximising proximal fixation in uncemented arthroplasties. Many patients undergoing TJR are also taking prophylactic treatment for osteopenia or osteoporosis. Bisphosphonate treatment is known to profoundly affect bone metabolism through both its direct action on osteoclasts and through incorporation into the hydroxyapatite crystal. It is unclear what effect bisphosphonates would have on the changes in proximal femoral bone mineral density (BMD) following THR. Investigators in **Spokane (USA)**

have conducted a randomised controlled trial evaluating the effects of zoledronic acid on femoral bone stock following THR. Patients were randomised to receive either 5 mg Zoledronic acid (27 patients) via IV infusion or placebo (24 patients) at two weeks and one year following surgery. Outcomes were assessed using dual X-ray absorptiometry (DXA), and the results were startling. Patients in the treatment arm were statistically significantly more likely to have higher BMD throughout all Gruen zones (+ 0.8% versus - 6.03%). The results were most marked by two years in zones 1 (18.3% difference) and 7 (17.7% difference).³ These results, on the surface at least, are remarkable and clearly demonstrate that in BMD terms, the use of bisphosphonates inhibits the loss of proximal bone following THR. What is not quite clear from these results is if the BMD differences will translate into clinically relevant findings, with lower revision rates in those taking bisphosphonates.

More fat, more operative time?

■ The occasional study comes across our desk that is so blindingly obvious that one wonders why the study was even performed. Researchers from **New York (USA)** entered into the tricky and thorny topic of THR in obese patients. With large numbers of high quality studies demonstrating functional and health economic benefits (although potentially higher complication rates), the research team decided to investigate the effects of obesity on operating time. Using a large single-surgeon series of 425 patients performed over a six-year period, the authors divided the patients by WHO-agreed BMI groups, with the outcome variables of total operating time, anaesthesia time and operating time. The researchers identified that the more obese groups all spent longer in theatre and surgery (but not under anaesthesia) than their normal weight and overweight counterparts.⁴ While we are not trivialising

the world obesity epidemic, we are uncertain what, if anything, this paper adds to the volumes already written on the topic. Surely the more soft-tissue there is, the longer it takes to cut through and sew up?

Raising the bar for surgical infection?

■ The most commonly quoted figures for infection in joint arthroplasty are based on epidemiological research performed many years ago, with patients being quoted figures of around 1% for infection. There has been little up-to-date research of a significantly large enough cohort of patients to be able to estimate the disease burden to healthcare services and the risk to patients that surgical site infection poses. An investigative team from **New York (USA)** have used the national inpatient sample data between 1998 and 2007 to analyse the surgical site infection (SSI) rates for 412,356 THRs and 784,335 TKRs. Data were collated to establish infection rates, length of stay and overall episode costs for both groups of patients. Infection rates were much lower than the rates commonly quoted with a 0.36% THR infection rate and a 0.31% TKR infection rate. Patients suffering an SSI were found to have a higher comorbidity burden, higher mortality rate, longer length of stay and higher complication rates. The total cost of inpatient stay was on average double for patients whose procedure was complicated by an SSI. The researchers were able (given the very large sample size) to establish independent risk factors for infection of male gender, ethnic minority, oncological diagnosis, coagulopathy or liver disease, heart or lung disease and electrolyte disorders.⁵ While this is an extremely powerful study it

only reports on inpatient infection rates and no attempt was made to link patient data with readmissions. Consequently, while this paints an accurate picture of the first few post-operative days, we would be concerned about the reliability of the quoted infection rates. Most deep infections present early in the post-operative course, but often not while an inpatient. While hugely valuable for identifying risk factors, this important paper must be interpreted in the light of its significant limitations.

Vascularised fibular graft for osteonecrosis?

■ Given the relative rarity of spontaneous osteonecrosis of the femoral head (ONF), it is surprising that the difficulties of treating ONF are often discussed. In another small contribution to knowledge in the field, researchers from **Shanghai (China)** have presented an interesting series of 21 patients with bilateral osteonecrosis of the femoral head.

The research team designed a prospective cohort study (Level III evidence) aimed at establishing the outcomes of ONF treated with vascularised fibular grafts. The study was conducted over a 3.5-year period and outcomes were assessed using operative duration, blood loss, complications and radiological and clinical (Harris hip score) outcome measures. The surgical procedure took almost three hours to perform, with only 20 minutes required to harvest the fibula. Amazingly, the surgical team reported no complications and a 100% integration rate of the fibular graft in the 21 patients.⁶ While their results certainly support the use of the vascularised graft, one does wonder how reproducible the results would be in other hands. A 0% complication rate and 100% integration rate is



certainly attractive but we are a little sceptical about how independently reproducible they may be.

Subclinical SUFE? An unrecognised epidemic

■ The precise cause of cam impingement is the subject of much debate, with more than a few hypotheses and supporting clinical and basic science papers. One oft-quoted hypothesis is that given the mechanical similarities to the slipped upper femoral epiphysis (SUFE) deformity, these patients may represent one end of the SUFE spectrum. The prevalence of an asymptomatic contralateral slip following surgery for an index SUFE is reported at an incidence of up to 40%. Reasoning that these may go on to develop into cam deformities later in life, researchers in **Bergen (Norway)** conducted a population cohort study of 2072 healthy adolescents. The patients were followed up with serial radiographs, and a history suggestive of an asymptomatic SUFE was suggested for patients with a Southwick's head-shaft angle $\geq 13^\circ$ and Murray's tilt index ≥ 1.35 . At the final follow-up patients were on average 18.6 years old, and all had completed both clinical examination and undergone two hip radiographs. Despite the slightly awkward study design (it may have been better to have serial radiographs and perhaps include early baseline imaging so a silent SUFE could be diagnosed radiologically), the research team identified an association between clinical features suggestive of SUFE (limited internal and increased external rotation) and increased head-shaft angle. Upwards of 13% of patients demonstrated a tilt index of > 1.35 and this was associated with other findings suggestive of cam impingement (pistol grip deformity, focal prominence) but not of clinical findings of SUFE.⁷ There is certainly some food for thought here, and this is a study which could be read in a number of ways. The data support the lateral neck-shaft angle as a predictor of clinically symptomatic previous SUFE and also (for the first

time) makes a strong link between the potential of subclinical SUFE and radiological features of impingement. We would thoroughly recommend the authors to continue their cohort study for a few more years. We would be fascinated to find out if this subgroup goes on to be clinically symptomatic with hip impingement symptoms as young adults.

Dentists, hips and antibiotics

■ We would finally draw the attention of our readers to the consensus statement of the American Academy of Orthopaedic Surgeons (AAOS) in **Rosemont (USA)** on dental procedures and implant infection. The transient bacteraemia, associated particularly with root canal

procedures, has paralysed generations of arthroplasty surgeons with fear, and posed a difficult question. Are prophylactic antibiotics required to cover this potential for infection? Following a thorough review of the available literature the AAOS has concluded that, based on limited evidence, they would not recommend the prescription of antibiotics for prophylactic cover of orthopaedic implants. The evidence is currently inconclusive surrounding the use of topical antibiotics following dental procedures. Finally, the consensus statement highlights the key importance of good oral hygiene as the best method to prevent oral-implant spread of micro-organisms.⁸

REFERENCES

1. **Jack CM, Walter WL, Shimmin AJ, Cashman K, de Steiger RN.** Large diameter metal on metal articulations: comparison of total hip arthroplasty and hip resurfacing arthroplasty. *J Arthroplasty* 2013;28:650-653.
2. **Unis DB, Hawkins EJ, Alapatt MF, Benitez CL.** Postoperative changes in the tensor fascia lata muscle after using the modified anterolateral approach for total hip arthroplasty. *J Arthroplasty* 2013;28:663-665.
3. **Scott DF, Woltz JN, Smith RR.** Effect of Zoledronic acid on reducing femoral bone mineral density loss following total hip arthroplasty: preliminary results of a prospective randomized trial. *J Arthroplasty* 2013;28:671-675.
4. **Wang JL, Gadinsky NE, Yeager AM, Lyman SL, Westrich GH.** The increased utilization of operating room time in patients with increased BMI during primary total hip arthroplasty. *J Arthroplasty* 2013;28:680-683.
5. **Poultides LA, Ma Y, Della Valle AG, et al.** In-hospital surgical site infections after primary hip and knee arthroplasty—incidence and risk factors. *J Arthroplasty* 2013;28:385-389.
6. **Gao YS, Liu XL, Sheng JG, et al.** Unilateral free vascularized fibula shared for the treatment of bilateral osteonecrosis of the femoral head. *J Arthroplasty* 2013;28:531-536.
7. **Lehmann TG, Engesæter IØ, Laborie LB, et al.** Radiological findings that may indicate a prior silent slipped capital femoral epiphysis in a cohort of 2072 young adults. *Bone Joint J* 2013;95-B:452-458.
8. **Watters W 3rd, Rethman MP, Hanson NB, et al.** Prevention of orthopaedic implant infection in patients undergoing dental procedures. *J Am Acad Orthop Surg* 2013;21:180-189.