

ROUNDUP³⁶⁰

Hip & Pelvis

X-ref For other Roundups in this issue that cross-reference with Hip & Pelvis see: Sports Roundup 4; Research Roundup 3.

One-staged combined hip and knee arthroplasty: retrospective comparative study at mid-term follow-up X-ref

■ While knee osteoarthritis (OA) continues to be more common than hip OA, there are a small subset of patients who have coexisting hip and knee OA. Patients have a significantly increased incidence of both if they are obese, were a former professional athlete, or have a metabolic syndrome, rheumatoid arthritis, haematological disorder, or immunological disease. In the current literature, there are a large number of studies looking at simultaneous bilateral hip or knee arthroplasties, but there are very few papers on simultaneous hip and knee arthroplasties. These authors from **Milan (Italy)** aspired to assess the clinical outcomes, implant survivorship, and complications in patients undergoing simultaneous hip and knee arthroplasty with contemporary implants as a single stage, and to compare them to patients who underwent a two-stage hip and knee arthroplasty. The authors cited just one, somewhat historic, publication, which reported a high complication rate and a poor (94%) three-year survivorship. Their own small series included 21 patients in the single-stage group, who were compared to a group that underwent a two-stage procedure, match-paired by sex, age, body mass index, and duration of follow-up. The mean age of the patients was 69 years and the mean follow-up was just over four years (50 months). Evidence of severe OA of both hip and knee, restricted walking, loss of function, and impaired quality of life were indications for surgery, and were therefore the inclusion criteria in this study. All patients underwent an uncemented total hip arthroplasty with a ceramic on polyethylene bearing, and either underwent a unicompartmental knee arthroplasty (UKA), patellofemoral joint (PFJ) arthroplasty, or a total knee arthroplasty (TKA) as

a single-stage procedure. Surgery was performed under a combined spinal-epidural anaesthetic, and tranexamic acid was used ten minutes preoperatively and five hours postoperatively. Patients in the single-stage group were given an epidural for the first 48 hours after surgery. There were no incidences of deep infection, thromboembolic complications, implant failure, or revisions during the follow-up period in the single-stage group. In terms of complications, one patient in the single-stage group developed a surgical wound infection, which resolved with antibiotics, and a second patient developed a urinary tract infection, which also resolved with antibiotics. There were two patients in the two-stage group that had a post-traumatic hip dislocation, both of whom were treated with closed reduction. One patient developed a stiff knee that resolved with additional rehabilitation. There was a statistically significant difference in the drop in haemoglobin (Hgb) following surgery, with a greater drop in Hgb in the single-stage group compared to the two-stage group (five transfusions in three patients vs three transfusions in two patients). Overall, hospital stay was shorter for the single-stage group of patients (15.5 days vs 27.2 days). Clinical and functional outcomes were no different. To summarize, patients who underwent a single-stage procedure had similar outcomes compared to patients who underwent a two-stage procedure. There was one single significant difference between the approaches. Single-stage patients sustained a significant reduction in postoperative Hgb of approximately 1 g/dl more than the two-stage group. However, there was no significant difference in transfusion rate between the procedures. Somewhat confusingly, the authors performed knee arthroplasties with a free-hand technique, without using instruments and cutting guides. While they argued that this would reduce operating time and intraoperative blood loss, one has to worry that this would result in increased component malalignment and poorer long-term functional and survival results.

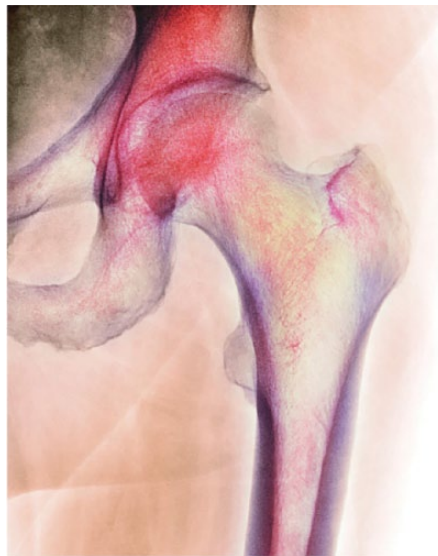
Another concerning factor was the considerable heterogeneity of the knee arthroplasties, including PFJ arthroplasty, UKA, and TKA. There is very little literature on this subject and, with an ageing population that will require more arthroplasties, it is increasingly likely that more and more patients with severe knee and hip OA will become apparent. While this study suggests that single-stage knee and hip arthroplasty is possible, it is not without risk. The majority of surgeons would feel uncomfortable performing a knee arthroplasty without the use of intramedullary instrumentation and cutting blocks. A problem highlighted by the authors, the use of such devices is likely to be associated with increased intraoperative blood loss. In addition, these patients are often elderly and have other comorbidities, such as cardiovascular disease and renal impairment. Because anaemia in these high-risk patients may lead to complications, blood loss could well be associated with an increase in the number of blood transfusions. There is already extensive evidence detailing the risks of blood transfusion in patients following arthroplasty, and so it should be avoided if possible. For this reason, despite the positive message of this paper, there is not enough evidence presented here to label one approach as superior, and, consequently, readers should still perform single-stage hip and knee arthroplasty with considerable caution.

Component alignment change after screw fixation in total hip arthroplasty

■ With a number of navigation systems exploding onto the market, including robotic-assisted surgery, there has been an increasing focus within the orthopaedic literature on component alignment in total hip arthroplasty (THA). Acetabular component mal-positioning in THA is known to be associated with an increase in impingement, dislocation, component migration, and polyethylene wear. In press-fit acetabular components, primary stability is essential for bone ingrowth or ongrowth, and secondary stability is achieved via

the coating. In addition to the press-fit, many surgeons use screw fixation to help with primary stability and develop that initial bond with the bone. In the past, however, concerns were raised over the screw's potential to move the component and produce a malalignment. The authors of this elegant study from **Mueang (Thailand)** used imageless navigation to display 'real-time' changes in component alignment after screw fixation.² A total of 99 patients, with a mean age of 63.7 years, were included in this study. Of those patients, 67 had sustained a neck of femur fracture, 25 had osteonecrosis, four had developmental dysplasia of the hip, and three had post-traumatic arthritis. The surgeon aimed for a component inclination of 40° (SD 10°) and an anteversion angle of 15° (SD 10°). Supplemental screw fixation was based on the surgeons' impression of the press-fit. If the press-fit was poor, additional screws were used. In 71 cases, one screw was utilized, and, in 28 patients, two or more screws were required. The component alignment changed after screw fixation in 73 cases (73.7%). The mean change of the inclination angle was 2.21° (0° to 8°). There was a statistically significant correlation between the change in inclination angle and the number of screws. Using one screw, the mean inclination angle change was 1.5° (0° to 5°); for two screws, it was 3.4° (0° to 8°). The anteversion angle changed in 49 cases (49.5%), with a mean change of 1.7° (0° to 5°). Again, there was a significant difference between patients using one screw and those using two or more screws, and there was a significant correlation between the change in the anteversion angle and the number of screws used. While the point raised in this study is nothing new, the method they chose to demonstrate the change in component orientation after screw fixation was simple and highlighted the importance of component orientation. Further, the authors have emphasized the importance of utilizing a good surgical technique in securing the screws. Most acetabular components come with a drill guide that needs to be properly seated in the screw hole. If the guide is introduced to the component screw hole at an angle, the screw may catch the edge of the hole, unhelpfully causing the component to move. Utilizing the 'home run' screw, which is usually at the centre of the screw holes, superiorly enables the component to be 'pulled in' without changing its orientation. If navigation is unavailable, placing two fingers of the opposite hand over the superior rim of the acetabulum as the screw is being advanced can give the surgeon some feedback as to whether the component is moving. Admittedly, this is somewhat rudimentary; however, because most surgeons do not use navigation, it is better

than nothing. If the surgeon finds the bone quality to be poor when reaming the acetabulum, and is concerned about achieving a good press, a cemented component could be used.



Does 'one, two' still equal a screw? X-ref

■ Residents the world over are taught the venerable Garden classification, often learning the mantra: 'One, two: give them a screw. Three, four: Austin-Moore'. Despite the Austin-Moore being now essentially obsolete, the sense is still there. In stable impacted hip fractures, the blood supply can be expected to be intact; as such, fixation in situ has been the standard of care for the entire history of modern orthopaedics. However, with grade three and four injuries, a hemiarthroplasty or total hip arthroplasty is needed. Led from **Honolulu (Hawaii)**, a multicentre, collaborative investigation has set out to re-examine this presumption.³ The authors ask the question: does posterior tilt of the hip fracture result in poorer outcomes if fixation in situ is used? The authors aspired to determine the association between posterior tilt in the neck and risk of subsequent arthroplasty. This paper is a preplanned analysis of the Fixation Using Alternative Implants for the Treatment of Hip Fractures (FAITH) trial, which examined sliding hip screws versus cannulated screws for hip fractures. All patients reported as part of this preplanned analysis were over 50 years old, and the authors undertook a further analysis of patients with a Garden I or II femoral neck fracture. For those with an adequate lateral film, the cohort was split into two: patients with a < 20° posterior tilt, and patients with a ≥ 20° posterior tilt. In total, the authors were able to screen 555 patients in the original FAITH study cohort, of whom 67 (12.1%) had high posterior tilt

and 488 (87.9%) had posterior tilt < 20°. In terms of outcomes, there was a 13.2% (n = 73) rate of conversion to arthroplasty in the two years following enrolment into the study. The authors undertook the kind of thorough multivariate analysis expected of a large randomized controlled trial secondary analysis, establishing that, even with adjustment for potential confounders, patients with a posterior tilt ≥ 20° had a significantly higher risk of subsequent arthroplasty (22.4% vs 11.9%, hazard ratio 2.22). They also identify a second factor associated with subsequent arthroplasty: age ≥ 80 years. This is a relatively simple secondary analysis of prospectively collected randomized controlled trials. The messages proposed by this paper are reasonably simple to implement into practice. It would seem sensible to have a lower threshold for arthroplasty in patients who are older than 80 years or have considerable posterior tilt.

What can we learn from arthroplasty litigation? X-ref

■ Every orthopaedic surgeon in practice will have been the subject of litigation in one form or another. While it is upsetting on a personal level and often leads to a defensive response, there is lots to learn from litigation. The authors of this paper from **Versailles (France)**, using a review of clinical negligence litigation for infected arthroplasties, set out to establish exactly what can be learned.⁴ The paper posits that, while infections complicate a minority of orthopaedic procedures, in contemporary practice, arthroplasties are the leading cause of malpractice claims. The authors acknowledge that, despite the volume of court cases, the basis for the claims is unclear. The study involved a comprehensive case-based review of all of the litigation cases brought against the authors' institutions, and established where there were deviations in practice from current recommendations. All cases were supplied by a major French medical liability specialized insurance company for private practitioners (Mutuelle d'Assurance du Corps de Santé Français (MACSF)). The records from MACSF covered a five-year period between 2010 and 2014. There were 45 claims made relating to prosthetic joint infection. Of these, the overwhelming majority (82%) of claimants were men, and the cohort had a mean age of 63 years. There was an even split between knees (47%, n = 21) and hips (47%, n = 21), with two shoulder arthroplasties and a single ankle arthroplasty. Just over half of infections occurred within one month postoperatively. *Staphylococcus aureus* was isolated in 36% of the cases (25% with methicillin-resistant strains), while coagulase-negative staphylococci were isolated in 51% (44% with

methicillin-resistant strains). Treatments lasted for a median of 9.5 months, comprising six months of antibiotics and three surgical procedures. Around 1:5 patients suffered antibiotic-related side effects, a single patient died, and 76% of patients had persistent sequelae. In terms of best practice, there were obvious discordances with therapeutic guidelines in 76% of the patient files, including delay in diagnosis (44%) and inadequate medical treatment (18%) or medicosurgical treatment (13%). The authors postulate that a reduction in malpractice claims may be achieved by earlier involvement of infectious disease consultants.

Do asymptomatic cams result in cartilage degeneration? X-ref

■ As we continue to investigate the pathophysiology of hip dysplasia, the individual components important in the pathology, and the morphological changes associated with cartilage degeneration, are becoming clearer. Specifically, there have been a range of high-quality case series and diagnostic studies that have examined the interplay between symptoms, anatomy, and scan findings in predicting pathology. Building on this work, a recent study from **Ottawa (Canada)** explores case prognosis in cartilage degeneration, considering cam deformities in the absence of symptoms.⁵ The authors charted the progress of 17 asymptomatic volunteers, all of whom were known to have a cam deformity, and undertook longitudinal hip imaging studies. Due to the possibility of subclinical articular damage, the study set out to establish if this presumed cartilage damage would progress. Using T_{1ρ} sequences, the prospective cohort underwent serial MRI scans to determine whether T_{1ρ} signal changes are predictive of symptom onset or associated with bony morphological parameters. There were two interval scans, and participants completed the Western Ontario and McMaster Universities Osteoarthritis Index questionnaire at recruitment and at four years postoperatively. Using the initial MRI scan, cam morphology was quantified and defined as an α angle $\geq 60^\circ$ anterolaterally and/or $\geq 50.5^\circ$ anteriorly relative to the neck axis. The authors went on to use the T_{1ρ} values (Δ T_{1ρ}) and relative differences (% Δ T_{1ρ}). A % Δ T_{1ρ} > 17.6% was considered clinically important. The headline result of this study was that the overall reported T_{1ρ} in this cohort of asymptomatic individuals remained unchanged between the initial and follow-up scans. Additionally, there were no differences in observed T_{1ρ} values between the anterolateral and posterolateral regions. Although the authors identified some signs of posterolateral joint degeneration, these

were not generally associated with symptoms. One of the two volunteers that experienced symptom onset had a clinically important increase in % Δ T_{1ρ}. Despite the laudable aims of this study, there were not enough patients or measured parameters to adequately answer the study questions posed. This resulted in the authors concluding that, “Future studies should be performed with a larger cohort and include femoral version among the parameters studied”. This does seem like an opportunity squandered; whether asymptomatic patients with a hip deformity later develop degeneration is a clinically important question.

Does vitamin E reduce wear in polyethylene?

■ The concept behind vitamin E-infused polyethylene (VEPE) is a deceptively simple one. Cross-linking of the ultra-high-molecular-weight polymer, usually through a heat annealing process, improves wear properties. This makes the polymer more resistant to abrasive and adhesive wear, but also more brittle. Because the process relies on free radical formation, there is a risk of oxidation-induced chain scission, which adversely affects the wear properties. Once manufactured, there is further risk of oxidation and subsequent injury to the mechanical wear properties of the acetabular component. This is usually combatted through storage of the component in a modified environment (usually nitrogen). However, even with these measures, oxidation is still a problem in contemporary hip arthroplasties. One method to combat this is the use of VEPE. The vitamin E is thought to oppose the potential adverse effects of oxidation. Despite the commercial availability and relatively widespread adoption of the technology, there is little data to support the claims of reduced wear (outside of the hip simulator). Therefore, here at 360, we were delighted when this article crossed the editorial desks. Researchers based in **Stockholm (Sweden)** designed their own double-blind non-inferiority trial to evaluate the in vitro wear properties of VEPE.⁶ In total, the authors enrolled 42 patients (21 male, 21 female) with osteoarthritis into their study. The primary outcome, proximal implant migration, assessed using radiostereometric analysis at two years of final follow-up. Other reported endpoints included total migration of the component, penetration of the femoral head into the component, and patient-reported outcome measurements. Patients were randomized in a 1:1 ratio to receive a reverse hybrid total hip arthroplasty with a cemented component of either argon-gas gamma-sterilized conventional polyethylene (controls) or VEPE, with identical geometry.

At final follow-up, the authors reported that they had observed a continuous proximal migration of the component in the VEPE group. This was a significant and clinically worrying migration when compared to the controls, with a mean difference of 0.21 mm (95% confidence interval 0.05 to 0.37). This was also reflected in higher total migration, but lower femoral head penetration. As would be expected in a small study, the authors established no difference in clinical outcomes between the groups. This is an important trial because it highlights the likely long-term outcomes of VEPE, and calls into question whether VEPE is a suitable technology for inclusion in total hip arthroplasties. In light of these findings, those who are using VEPE, and those who have used it in the past, should keep a careful eye, and continuous follow-up, on these patients.

Does intraoperative periprosthetic fracture affect longevity?

■ Intraoperative periprosthetic fractures are one of the major differences seen between cemented and uncemented stems. Due to the ‘fit and fill’ approach needed to broach and then achieve primary fixation in an uncemented stem of any design, there is a higher rate of periprosthetic fractures. This has been made worse by the drift towards minimally invasive procedures such as the anterior hip approach, which boasts the advantages of smaller incisions, muscle sparing, and better clinical outcomes. While the incidence of these fractures is recognized, the long-term implications are still unclear. These authors from **Leeds (UK)** utilized the world’s largest joint registry, the National Joint Registry for England, Wales, Northern Ireland and the Isle of Man, to establish the longer-term implications of intraoperative periprosthetic fractures on stem survival.⁷ For the study group, patients who suffered intraoperative periprosthetic femoral fractures (IOPFFs) when undergoing primary total hip arthroplasty (THA) were matched to controls who did not. The results of the study are based on 4,831 IOPFF patients compared to 48,154 controls, matched using propensity score matching. Outcomes assessed were patient and implant survival rates, which are the only reliable outcomes recorded in the majority of joint registries. Overall, the ten-year survival rate was poorer in the IOPFF group, with a 7.2-fold increased risk of revision following shaft fracture, and a 2.8-fold increased risk of revision following trochanteric fracture. The risk of mortality following IOPFF without revision was increased 1.7-fold and, with revision, was increased 4.0-fold, when compared to uncomplicated primary THA.

Metal-on-metal hip and activity

■ The metal-on-metal hip saga is far from over. Despite early reports of success being followed by concerns surrounding articular surface replacement (ASR) resurfacing, metal-on-metal hip resurfacing is probably correctly indicated. Birmingham Hip Resurfacing (BHR) continues to have acceptable survivorship. There is more data on BHR, but there are several other systems also in use. Although poorer than a traditional total hip arthroplasty, there are a number of indications for which mainstream surgeons and enthusiasts will use BHR preferentially. Sometimes, a patient needs a high-performance hip arthroplasty to allow them to continue a high level of physical activity. While there is a general consensus and some evidence to support the statement that higher levels of sporting and physical activity are possible with hip resurfacing, there is not much data on longevity implications for metal-on-metal resurfacing in the high-performance patient. This particular paper from **Los Angeles, California (USA)** reports on a large series of Conserve Plus hip resurfacings, and asks the question: is it safe to return to sports

following hip resurfacing?⁸ The results from this paper are drawn from a series of 1,033 consecutive hip resurfacings. The authors were able to include follow-up information from 77% of these (n = 806). They were, as would be expected, a younger series of patients, with a mean age of 52 years. Their mean body-mass index was 26 kg/m². Activities undertaken postoperatively were divided into 17 subgroups dependent on the physical characteristics of the activity. The authors also collated data on the frequency and intensity of the exercise. The findings of this study can be easily summarized: in this series, there were no differences seen in resurfacing longevity based on impact activity or activity levels.

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Knee

X-ref For other Roundups in this issue that cross-reference with Knee see: **Hip & Pelvis Roundups 1 & 4; Sports Roundups 1 & 3; Research Roundups 3 & 4.**

Preoperative weight and total knee arthroplasty: how much is enough?

■ The perennial hot potato of weight and large joint arthroplasty is given a fresh look by surgeons in **Lebanon, New Hampshire (USA)**.¹ The vast majority of surgeons would agree that there is now ample evidence to suggest that weight loss improves pain in arthritic joints, reduces the risks of surgery, and may also improve implant longevity. In light of this, many arthroplasty surgeons will have their own protocols for managing patients with high body mass index (BMI), such as pre-surgery cut-offs, and others may adhere to those imposed by payers or hospitals. Considering the evidence, every arthroplasty surgeon who counsels obese patients should recommend weight loss prior to surgery. However, although we often tell patients to lose weight, until now, we have never as a profession had any information that indicates the exact amount that our patients need to lose. Taking a refreshingly realistic approach to the problem, the

research team tried to establish, in a cohort of morbidly obese patients (BMI \geq 40 kg/m²), the weight loss required to improve operative time, length of stay, discharge to a facility, and function as measured by the Patient-Reported Outcomes Measurement Information System (PROMIS). A cohort of 203 patients who were operated on over a five-year period at their tertiary referral centre, and who had a BMI of over 40 kg/m² at least 90 days preoperatively, were identified. The authors also had access to immediate preoperative patient BMI measurements. Adjusted analyses were undertaken for age, sex, year of procedure, laterality, comorbidity, and physical function to establish the optimum weight loss threshold in order to reduce operative complexity. In this cohort, 41% had lost 5 lbs or more prior to surgery. Losing 20 lbs was associated with a lower adjusted odds of discharge to a healthcare institution (odds ratio (OR) 0.28) and lower odds of extended stays of at least four days (OR 0.24). Differences in operative time were also observed. Interestingly, patients who instead lost 5 lbs or 10 lbs did not see these benefits. Now, using this study for reference, we can give patients a target weight loss of 20 lb, substantiated by well-supported data. This can provide better patient outcomes and give

patients a tangible goal with a known clinical benefit prior to undergoing arthroplasty.

Experienced surgeon or robot in unicompartmental knee arthroplasty?

■ Many surgeons and patients question the necessity and benefit of digitization and robots. In this day and age of technological advances, it is tempting to presume that machines can, and will, do better than their human counterparts. There have been a number of randomized, pseudorandomized, and cohort studies looking at both guided and robot-assisted surgery. However, this paper from **Fishers, Indiana (USA)** pits the accuracy of a single surgeon against the best published figures for robotic-assisted surgery.² While a slightly tricky paper to interpret – the authors have essentially performed a literature review to establish the published accuracy for component alignment by a robot and compared this with their single surgeon series – there are some interesting points made. A consecutive series of unicompartmental knee arthroplasties (UKAs), performed by a single surgeon with a fixed-bearing implant, underwent radiological analysis in order to establish the final component alignment. Alignment was measured