ROUNDUP360

Hip & Pelvis

X-ref ***For other Roundups in this issue that cross-reference with Hip & Pelvis see: Knee Roundup 1; Trauma Roundups 1, 4 and 5; Children's orthopaedics Roundups 4 and 5; Research Roundups 1, 2, 3 and 7.***

Resurfacing a new breath of life?

■ Hip resurfacing has faced a somewhat torrid time of late, suffering from withdrawal of implants, loss of surgeon and patient confidence, and ultimately some class action lawsuits. However, not all implants are the same. The Birmingham Hip Resurfacing continues to perform acceptably in the various joint registries, and although overall class failure rate is higher than overall failure rates for total hip arthroplasty (THA), there remains some uncertainty over the comparative outcomes in specific patient groups. Subgroup analysis of the various large registries suggests that patients under the age of 50 years do particularly poorly with hip arthroplasty, and that ten-year survivals reported by the Nordic registry are just 83%. An American group from **Columbia, South Carolina (USA)** have published the largest series to date of hip resurfacings and reported their outcomes to 12 years using the now standard Kaplan-Meier method.[1] Their single-surgeon series of patients aged under 50 years (1285 consecutive operations in 1062 patients) is a retrospective analysis from a single unit database. The authors also report a comparative group of 1984 operations undertaken in 1614 patients aged 50 years and over. The headline survivals for this series are 96.5% at ten years and, remarkably, this survival figure did not differ from their own series of older patients. The authors also report just four (0.3%) adverse wear-related failures, and no cases of raised ion levels of frank loosening since 2009. This series, as with all retrospective studies, is not homogeneous, and in this case the surgeons changed the choice of implant twice during the period studied. However, this is part of the message of the paper, namely that ongoing developments in the understanding of failure modes are leading to ever better results with resurfacing. Each change to a newer implant in this series led to an improvement in both clinical outcome data and implant survivorship. Moreover, it is interesting that their current implant of choice, which exploits an uncemented femoral component, has virtually eradicated the difference in survivorship between male and female patients. Up to this point, it has been widely accepted that women achieve inferior results from resurfacing compared with men. The authors also make particular reference to current NICE guidelines, recommending that implants should only be used that can demonstrate 95% survivorship at ten years. The data presented here would suggest that such results are certainly achievable with resurfacing arthroplasty, even in a young and active population. They also demonstrate no statistical difference in either Harris Hip Score or implant survivorship between the under 50s and over 50s, although as might be expected, activity levels were higher post-operatively in the younger group. Adverse wear-related failure rates were low at a reported 0.3%. This is a genuinely interesting study as it challenges much of the current opinion regarding hip resurfacing, which has largely fallen from favour. These results, which compare positively against current outcomes in the literature for THA, suggest that resurfacing should not yet be fully consigned to the scrap heap.

Sports, arthritis and the periacetabular osteotomy

■ Periacetabular osteotomy (PAO) has become a well established technique for the treatment of acetabular dysplasia, and although there are a number of techniques they all share the same treatment goals of reducing pain. Increasingly, surgeons are arguing that in the longer term a PAO may delay the advent of osteoarthritis (OA) requiring total hip arthroplasty (THA). As this tends to be a procedure undertaken in young active patients, many wish to return to sporting activity once recovered, and there is little in the way of evidence to inform patients and surgeons if this is a good idea or not. This well constructed study from **Fukuoka (Japan)** seeks to establish whether the development of OA is likely to progress faster in patients who routinely undertake sporting activity.[2] While this is not the first study to assess this, the authors are correct that their series comprises both larger patient numbers (161) and longer follow-up (mean 100 months) than previous publications. Patients were retrospectively identified from a single-unit registry, and outcomes were assessed using a patient-completed questionnaire prospectively. All those who responded and met certain criteria were included in the final dataset. The outcomes were essentially a comparative series of the 16 hips in which the Kellgren-Lawrence (KL) grade had progressed to 3 or 4 (including four requiring THA), and the remaining 145. The key findings of this paper are as follows: there has been a substantial and significant increase in the proportion of patients undertaking regular sporting activity following PAO, from 31% pre-operatively to 55% post-operatively; and second, that neither regular sporting activity, nor any other of several parameters assessed (age, BMI, follow-up duration, treatment for DDH, a range of functional scores, centre-edge angle, and KL grade), was shown to increase the rate of progression of hip OA. Not surprisingly, participation in sport pre-operatively was a strong predictor of return to sport following surgery. The statistical analysis is explained in detail, within the constraints of small patient subgroups, and supports the authors' conclusions. Overall, these results are encouraging for advocates of PAO, suggesting that it is appropriate to counsel patients not only that the surgery has a reasonable likelihood of increasing their capacity for participation in sporting activity, but also that doing so will not increase the risk of subsequent OA, at least in the mid-term.

Dabigatran or apixaban? Perhaps not as equal as one might think X-ref

■ Despite a myriad of papers on the topic, endless debates, specialty

meetings, focus days, national guidelines, randomised controlled trials, and even special reports by the joint registries, it appears that the topic of appropriate anticoagulant prophylaxis continues to be one without broad-based agreement. We struggle here at *360* to keep apace with the latest opinions as they are often founded on personal experience more than on scientific evidence. Oral anticoagulants have gained a reasonable level of popularity as thromboprophylactic agents, potentially offering increased patient satisfaction and a simple route for those who cannot self-administer. There are, however, some specific concerns about their use following total hip and knee arthroplasty (THA, TKA). With a lack of a suitable 'antidote', widespread anecdotal concerns, supported to a degree by the literature, remain over a perceived increase in the risk of wound complications with oral anticoagulants as opposed to with low-molecular-weight heparin (LMWH) or aspirin. This is a simple but well written paper from **Markgröningen (Germany)** which seeks to answer a very specific question.[3] If one is to use oral thromboprophylaxis following large joint arthroplasty, which of two agents - apixaban (acting directly on factor Xa) or dabigatran (a thrombin inhibitor) - should one use? The authors set out to establish which agent led to longer wound ooze post-operatively using 400 non-randomised arthroplasty patients, divided into two matched groups, each receiving one or other agent. Details are sparse on the methodology, particularly with regard to exactly who assessed the wounds post-operatively which is potentially a source of bias. Nevertheless, in their series of 400 patients (200 hips and 200 knees), the authors found that both hip and knee patients had a significantly longer duration of post-operative wound ooze (1.2 days in both THA and TKA groups) if they had received dabigatran as opposed to apixaban as the oral anticoagulant agent. No differences were identified in any of the other parameters assessed, including thromboembolic complications, requirement for blood transfusion and bleeding complications. The *post hoc* power analysis (which in itself is a flawed methodology) suggests that this is a study of a size sufficient to attach validity to the data. While the authors are correct in stating that a larger, multicentre randomised study is required to draw more detailed conclusions, surgeons using the new oral anticoagulants would do well to consider these findings, albeit from a lower evidence base than we are becoming accustomed to in orthopaedics. The authors do not assert that the rate of wound complications is higher following the use of dabigatran compared with apixaban, but their conclusion that wound healing takes longer with the former than with the latter is well supported by their data.

Captive cups and hip instability: a registry perspective

Recurrent instability following total hip arthroplasty (THA) is a notoriously difficult problem to manage, with a variety of potential causes from component malalignment through to muscle mass loss, failure to adequately tension the abductors, difficulties associated with neuromuscular problems, or occasionally impingement. While some of these are technical surgical errors, others are unavoidable, particularly those problems associated with soft-tissue loss. One of the methods traditionally used to address recalcitrant instability is revision to a constrained prosthesis. However, doubts persist regarding the longevity of these implants. By introducing new couples and articulating surfaces, there is the potential to introduce new and unique mechanisms of failure. Concerns abound regarding failure of either the locking mechanism or the interface between implant and underlying bone. These concerns are more than just idle worry, as the constrained liner does not deal with the underlying cause of instability, it increases the constraint in the joint and there is the potential to transfer massive forces to the implant bone and head: acetabular components. This large registry paper from the **Australian Joint Registry** compares outcomes for revisions using constrained *versus* non-constrained implants.[4] There were, as would be expected, a large number of revisions (9509 first revisions) reported in the analysis, of which 700 used constrained components. Dislocation was a far commoner indication for constrained revision than for revisions with unconstrained implants. The authors draw a number of conclusions by undertaking statistical analysis with different subsets but a couple of interesting findings stand out. First, and perhaps unsurprisingly, revision rates were disproportionately high in patients when the analysis included a large-head metal-on-metal bearing. Perhaps more pertinent, though, was the finding that where the initial indication for revision was dislocation, the risk of re-revision was no lower in the constrained cohort than in the unconstrained. Indeed, not only did the constrained subset in this group have a high risk of acetabular component breakage, the overall risk of recurrent instability was higher in the constrained group than in patients with conventional sockets. While the author is correct to acknowledge the methodological flaws inherent in registry studies, in particular bias in implant selection, these results are nevertheless thought-provoking in that they suggest that there is no great long-term benefit in the use of constrained prostheses. Although no data regarding the use of dual mobility cups (which may resolve a number of the problems associated with constrained acetabular components) are included in this study, the authors' conclusion that these may provide a more reliable solution to recurrent THA instability than constrained hips certainly seems worthy of further investigation, even if it isn't supported by any presented evidence in the current study.

Implant retention in periprosthetic infection

Periprosthetic joint infection (PJI) is a devastating complication following total hip arthroplasty (THA), and for many years the gold standard treatment has been a two-stage revision. The prolonged period of reduced mobility and exposure to the risks of two large operations has fuelled an increasing appetite for single-stage revision with the DAIR technique (debridement, antibiotics and implant retention). Proponents of the DAIR technique argue that the maintenance of a sound prosthesis/bone interface may lead to better outcomes compared with implant revision. The authors of this paper from **Oxford (UK)** designed a retrospective, case-control study to identify the outcome following DAIR and traditional two-stage revision.[5] This retrospective study evaluates the outcomes of 82 patients treated with the DAIR approach and reports prospectively collated outcomes and complications data. These were compared with a cohort of 66 two-stage revisions and 120 primary THAs. The authors considered DAIR a suitable option in all cases of PJI with a well fixed implant, irrespective of time course, and modular implant component exchange was performed when necessary. At a mean follow-up of 7.5 years (2 to 18), 26 patients had died. There were 31 (38%) complications following the DAIR technique, including 26 (32%) with a persistent infection and seven (9%) with a dislocation. A repeat DAIR was performed in 20 hips, and six hips underwent a two-stage revision. A repeat DAIR eradicated the infection in 14 hips. Overall, the DAIR technique eradicated infection in 70 hips (85%). As is often the case with relatively small studies, no patient factor or infective organism appeared to affect the chance of infection eradication. However, success rates were highest with short

intervals between infection and surgery and with modular component exchange. The success of DAIR treatment (85%) and two-stage revision (89%) was similar, while functional outcomes measured by the Oxford Hip Score were superior in the DAIR group compared with the two-stage revision group. Patients requiring more than one DAIR had comparable functional outcomes to patients who had undergone a two-stage revision. The take home message from this paper is that the DAIR technique should be considered in the treatment of infected THA whenever the prosthesis/bone stability is sound. Nevertheless, the authors also pointed out the importance of treating these challenging patients with a dedicated multidisciplinary team and also proceeding with a DAIR within seven days of onset of symptoms. Perhaps most significantly, the DAIR technique was five times more successful if the modular components were exchanged.

Outpatient *versus* inpatient total hip arthroplasty

There has been a considerable focus on reducing patient length of stay in hospital in the last ten years, not just in lower limb arthroplasty but in all surgical disciplines. This has been achieved with a multifactorial approach including peri-operative pathways, reduction of healthcare expenditure, and early mobilisation to reduce complications. An important component in reducing length of stay is also managing patient expectations during this process. Through expectation management, some centres have been able to achieve next-day, or even same-day, discharge. This is the first prospective randomised multicentre study from **Alexandria, Virginia (USA)** to evaluate and compare patients undergoing total hip arthroplasty (THA) who were discharged on the same day as their surgery with those who were discharged following an overnight stay.[6] The patients were included in the study if they were less than 75 years old, had a BMI < 40, mobilised without aids and did not require opioid analgesia pre-operatively. Of the 220 patients, 112 were randomised to the same-day surgery group (discharge within 12 hours) and 108 were randomised to the overnight group. Surgical details were identical with an anterior approach primary THA performed under spinal anaesthesia. Patients started their physiotherapy between 1.5 and three hours from the end of surgery, largely dependent on the restoration of normal motor and sensory function once the spinal anaesthetic had worn off. Of the 112 patients randomised to the outpatient group, 85 (76%) were discharged on the same day of surgery. Of the remaining 27 patients, 26 were discharged the following day and one patient was discharged after two nights. Reasons for a delayed discharge included dizziness/hypotension, pain, patient preference, nausea, difficulties mobilising and urinary retention. Of the 108 patients randomised to an overnight stay, 81 (75%) went home the following day. Of the remaining 27 patients, 18 elected to leave on the same day of surgery, and nine patients stayed more than one night. This study did not demonstrate an increase in complication rate, hospital re-admission or clinic visits, although it was not adequately powered to assess such differences. The main limiters to early discharge in this study were nausea and dizziness associated with hypotension. This study was performed in the US and to those of us in the UK, same-day discharge following a THA is just a pipe dream. The two institutions where this randomised study was performed had an excellent infrastructure to support same-day discharge where the norm was an overnight stay. Some would argue that it was therefore not a huge leap to reduce the length of stay to within 12 hours. However, despite this support, there were patients who were unable to be discharged within 12 hours, with more than 20% failing the criteria. What was not apparent from this study was the importance of the surgical technique and a well developed post-operative care protocol, in combination with careful setting of patient expectations. The results from this important and well designed study may not be reproducible in all orthopaedic centres at present, but it does have some important messages and suggestions on how length of stay can be reduced safely with better clinical outcomes for patients.

Implant survival and hip approach

There have been a number of 'fads' over the years with hip approaches. Although the venerable posterior and direct lateral approaches continue to be the most widely used, there has been significant support for the minimally invasive versions (even with a two-incision posterior approach finding favour a few years ago) and a rekindled interest in the muscle-sparing anterior approach. Despite these dramatic changes in practice over the years, there is little literature comparing minimally invasive approaches with conventional approaches, and in particular the potential effect on implant survival in a reasonably sized study is conspicuous by its absence from the contemporary literature. We were therefore delighted here at *360* to read this report from the **Norwegian Joint Registry**.[7] The authors utilised the large Norwegian Registry database to tackle the question of post-operative revision after THA employing the different approaches. The registry recoded 21 860 uncemented THAs reported over a five-year period with a minimum of two years' follow-up. The group sizes were, as expected, somewhat mismatched, with 2017 implanted through a minimally-invasive (MIS) anterior approach, 2087 through a MIS anterolateral approach, 5961 through a posterior approach, and 11 795 through a direct lateral approach. The authors determined that, over a six-year time span, the rate of implant revision for any reason was indistinguishable between the four different approaches. As perhaps would be anticipated, posterior approach THA patients had a higher rate of dislocation. However, the authors did not take intra-operative complications into consideration, such as intra-operative femoral fractures, which are the most common complications with MIS surgery and uncemented femoral components. While these findings are interesting, and certainly add some valuable data to the argument, further prospective studies with more granular data will clearly need to be conducted in order to evaluate further other complications that may be encountered when utilising these four different approaches.

Tantalum acetabulum 'the bee's knees' in revision hip arthroplasty

As newer and cheaper implants are entering the market, it is important to remember that long-term follow-up data are key to providing evidence that should influence implant choices that provide the best results for our patients, and often the best value for the healthcare funder. These authors from **Rochester, Minnesota (USA)** provide important mid-term follow-up on the increasingly popular porous tantalum acetabular shells and augments.[8] Despite being eye-wateringly expensive, these implants offer the unique ability for complete osseo-integration and provide the option for revision hip surgeons to tackle some very tricky bone loss with an augment, allowing for almost immediate mobilisation. Nonetheless,

questions remain over the longer-term outcomes with the technology as yet to be proven in any reasonable series with longer-term follow-up. As always, the Mayo Clinic have been able to assemble an impressive number of 58 cases, all revisions, in which a trabecular metal revision acetabular shell was used with augmentation. The authors present their results with five years of radiographic data. The bottom line is that, in this series, a survivorship of an impressive 97% was seen. The authors did, however, discern a not insignificant incidence of radiolucent lines (with 10% of revisions demonstrating a Zone 3 radiolucent line). The authors note that the presence of a radiolucent line is not necessarily indicative of implant failure. From a clinical perspective, the pre-operative mean Mayo Hip Score of 35.7 improved to 61.9 immediately post-operatively and there was little change (mean 61.7 minimum five-year follow-up). These results are promising, and although longer-term follow-up of these implants is clearly required, there are enough data here to support the use of acetabular tantalum shells and augments in the revision hip setting.

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Knee

X-ref ***For other Roundups in this issue that cross-reference with Knee see: Hip Roundup 3; Trauma Roundups 1 and 3; Research Roundups 1, 2, 3 and 7.***

How many cultures in arthroplasty infections? X-ref

■ Identifying the infecting organism from fluid and tissue cultures at the time of surgery is vitally important in the treatment of periprosthetic joint infection. Although RNA PCR has added significant sensitivity to diagnosis, it doesn't yield the same information as direct culture. Knowing the organism and making the appropriate selection of antibiotics can provide prognostic and treatment information. However, failure to identify the infecting organism, with a failure rate as high as 11.9% in some series, remains a significant barrier to successful infection eradication. There is, however, some debate surrounding the optimal number of samples to maximise sensitivity, with excessive samples adding to cost and an increased risk of a false positive culture result. These authors from **Philadelphia, Pennsylvania (USA)** included the results of 74 consecutive infected joint arthroplasties.[1] As well as synovial fluid, multiple tissue samples were taken from the synovium, intramedullary tissue and the prosthetic interface, as well as tissue from adjacent bone. One specimen from each case was identified as the 'best culture' and was tested for atypical organisms such as mycobacterium and fungus. The average number of cultures taken was 4.2 (1 to 10) and the median was four. The authors of this paper concluded that the optimal number of cultures necessary to identify an infecting organism was four, which included synovial fluid cultures. At this threshold, the sensitivity and specificity was 0.63 and 0.61, respectively. Although increasing the number of samples increased the sensitivity, it was to the detriment of the specificity, with an increasing number of false positive results. The single 'best culture' at the time of surgery did not appear to increase the likelihood of a positive culture. Interestingly, intra-operative synovial fluid collection was equally as sensitive as tissue cultures from multiple areas in diagnosing infection. What was a little disappointing from a study that was looking at the optimal number of samples to obtain at surgery was that there was no 'sonication' of the implants removed at the time of surgery. Some have argued that this can improve the sensitivity in detecting organisms. While the study does have its weaknesses which the authors address in their discussion, it is one of the more recent papers to assess the optimal number of intra-operative samples that should be taken without compromising the specificity. It would be interesting to repeat this study to include some of the innovative ways to help reduce the chance of negative culture results. I would also agree with the authors that, should this study be repeated, the methods for taking tissue samples, as well as collection and processing, should be standardised.

Skin closure after total knee arthroplasty: what is the best method?

■ Although there have been many studies looking at wound closure in total knee arthroplasty (TKA), these are somewhat varied in their design and conclusion, and there has been no recent meta-analysis. This paper from **New York, New York (USA)** goes to great lengths to compare the best methods of wound closure following TKA.[2] Surgical wound problems are responsible for an increased length of hospital stay, higher readmission rates, more complications, and, with that, increased healthcare costs, as well as the cost to the patient. Wound appearance may also have an impact on patient satisfaction rates. The authors performed a meta-analysis of articles published between 2000 and 2016, including the outcomes of 828 TKAs, of which 366 were closed using sutures and 462 with staples. The bottom line here is that there was no statistically significant difference between the two groups in the incidence of superficial and deep wound infection, abscess formation and prolonged wound discharge. There was an increased risk of wound dehiscence in the suture cohort and, unsurprisingly, wounds closed with sutures took up to 14 times longer than wounds closed with staples.