

ROUNDUP360

Hip & Pelvis

X-ref For other Roundups in this issue that cross-reference with Hip & Pelvis see: *Children's orthopaedics Roundup 3; Knee Roundup 3; Oncology Roundup 1; Research Roundups 2 & 5; Trauma Roundups 5, 6 & 8.*

Multiple sclerosis and joint arthroplasty X-ref

■ This is a fairly large retrospective review from **Philadelphia, Pennsylvania (USA)** of 108 patients, all with an underlying diagnosis of multiple sclerosis (MS) and who had undergone either hip or knee arthroplasty surgery.¹ While it is already broadly recognized that MS predisposes to high complication rates following both hip and knee arthroplasty, the value of this series comes from the numbers involved as well as the duration of follow-up. Multiple sclerosis increases post-surgical complication rates, with muscle weakness potentially leading to poorer functional outcomes and dislocation of the hip. The authors acknowledge some inherent weaknesses in their study, including the fact that, for the purposes of statistical analysis, they had to group knees and hips together. They also recognize that MS is a very diverse condition in terms of its clinical manifestations, making it difficult to draw firm homogeneous conclusions. Furthermore, there are the inevitable shortfalls of a retrospective study. The paper was a retrospective review of 46 knees and 62 hips, identified from ICD-9 codes linked to a clinical electronic record system. The primary outcome was all-cause revision reported using

Kaplan–Meier analysis. The authors were able to describe 108 arthroplasties reported to a mean of a little over six years of follow-up. In that time, 19% of patients had required revision predominantly for instability (5.6%) and periprosthetic joint infection (4.6%). Despite the relatively low numbers, this paper throws up some useful data when this patient cohort is analyzed in comparison with a matched non-MS control group. Infection rates, joint instability, and ongoing risk of revision were all significantly higher in the MS cohort versus the control group. The MS cohort also demonstrated a smaller improvement in symptomatic and functional outcomes when compared with preoperative levels. As the authors state, the data presented here do suggest that, as long as appropriate counselling takes place, total hip and knee arthroplasties do have a role to play in improving function and symptomatology in osteoarthritic patients with concomitant MS. The take-home message is that this series supports previous anecdotal and case report evidence that a careful counselling process is required to apprise patients of their risk profile.

Hip arthroscopic surgery: achieving clinically significant outcomes

■ Although arthroscopy of the hip continues to be undertaken in ever-increasing numbers, there remain those who question its clinical efficacy. This paper from the Rush Institute in **Chicago, Illinois (USA)** aims to shed further light on this issue.² The authors utilized a

prospective institutional registry to report the outcomes of 474 patients, of whom 386 had data at a minimum of two years of follow-up. These authors report the Hip Outcome Score (HOS)–Activities of Daily Living (ADL) results in this large cohort of patients, all with femoroacetabular impingement. Overall, there was a significant improvement in the HOS-ADL, HOS-Sports-Specific Subscale (SSS), and Harris Hip Score. Despite the short follow-up, there was a low rate of revision, with just 1.2% of patients undergoing revision hip arthroscopic surgery and 1.7% being converted to a total hip arthroplasty. In terms of clinically meaningful outcomes, the authors were able to demonstrate that the minimal clinically important difference (MCID) was achieved by 78.8% of patients for the HOS-ADL, and the patient acceptable symptom state (PASS) was achieved by 62.5% for the HOS-ADL. Taken together at two-year follow-up, these statistically significant improvements in a range of both subjective and objective outcome measures add some meaningful clinical data to what is already known about patients being treated for femoroacetabular impingement (the commonest, although by no means only, indication for this procedure). Against a backdrop of growing numbers of publications attempting to demonstrate the same take home message, the real value of this particular study comes from the fairly large number of patients in the series. It is notable that patients underwent a capsulectomy early in the procedure that was subsequently

repaired; there seems some logic to the authors' conclusion that this may have contributed to the particularly encouraging results identified in this series. Perhaps unsurprisingly, the data also suggested that younger patients, and those with a lower body mass index, were more likely to achieve clinically favourable outcomes, as were those with no preoperative radiological evidence of even early degenerative change. While this study does not differ hugely from other work published on the same subject, the fairly robust methodology and sizeable cohort certainly add further support to the ever-increasing popularity of hip arthroscopy.

Blood metal ion thresholds and implants at risk of adverse reactions to metal debris

■ This paper from **Oxford (UK)** discusses a now well-worn topic: how to assess and treat patients with metal-on-metal (MoM) total hip arthroplasty who are potentially at risks of adverse outcomes due to their articulations.³ The paper describes a validation study, assessing the discriminatory characteristics of implant-specific plasma metal ion thresholds in identifying individuals at potential risk of developing adverse reactions to metal debris (ARMD). The premise for this piece of work is that the nationally prescribed metal ion levels currently in widespread use may be too high in the context of some specific prostheses, with the result that a proportion of ARMD patients may fail to

be identified. Because the paper describes data from three different centres (respectively undertaking unilateral Birmingham hip resurfacing (BHR) procedures, bilateral BHR, or Corail-Pinnacle metal-on-metal total hip), there is some variation in the precise diagnostic and investigation protocols employed. The authors applied the implant-specific thresholds described in two previous studies from their own centre to the three-centre external validation group, and then assessed the area under the curve, sensitivity, specificity, and positive and negative predictive values of these specific thresholds in order to identify patients with or without ARMD. Their study revolves around a validation cohort of 803 MoM hip arthroplasties performed in 710 patients (323 unilateral BHR, 93 bilateral BHR, and 294 unilateral Corail-Pinnacle implants) at three centres. Within the whole cohort, there were 75 patients who were classed as having ARMD (leading to revision or identified on imaging). The authors then applied the previously devised and widely used thresholds for MoM adverse reactions, and undertook a receiver operating characteristic (ROC) curve analysis to establish the diagnostic value of these threshold values for serum bloods. When using the implant-specific thresholds, the authors missed only 20 ARMD patients within the total studied population. When using the Medicines and Healthcare Products Regulatory Agency (MHRA) threshold, the figure rose to 35; it was 46 when the Food and Drug Administration (FDA) cut-off was applied. All differences were statistically significant. Although somewhat esoteric at first glance, this study is of value in demonstrating a lower likelihood of failing to diagnose ARMD if the implant-specific metal ion levels suggested here are used. At present, this clearly only pertains to the particular implants discussed in this study, but this work does also suggest a possible role for further

research examining similar parameters for other prostheses.

Improving acetabular cup position

■ Variation in the accuracy of acetabular component positioning is widely recognized as a potential source of poor outcome following total hip arthroplasty (THA), in particular with regard to instability. The use of either computer navigation systems or robots has formed the mainstay of recent strategies to minimize such variation; however, both of these options are expensive, usually require cross-sectional imaging, and are resource-intensive. This group from **Nara (Japan)** have previously published a description of a fairly straightforward ‘anterior pelvic plane lateral positioner’.⁴ The present paper goes one step further and nicely describes a series of 76 hip arthroplasties undertaken using this positioner in conjunction with an acetabular component alignment guide specifically designed to complement it. On the basis of preoperative CT scanning, the optimal target component position for each individual patient was determined on the basis of their unique bony anatomy, and by the position-alignment guide system used to try and achieve this. A comparator group of 60 cases was undertaken using a standard alignment guide provided by the implant manufacturer. All patients underwent repeat CT scanning three months postoperatively to determine component position accurately. In the conventional group, 68% of cases demonstrated component positioning within the ‘safe zone’; the rate was statistically higher in the intervention group (89%). With regard specifically to the target positioning for each individual patient, 20% of the control group were found to have a component position deviating from the target by more than 20°. In the intervention group, this was only 5.2%, which again was a statistically significant difference. Although the use of this

system requires preoperative CT scanning (not routinely undertaken before most primary THAs), this is similar to the preoperative requirements for navigation and robotic systems, and certainly the system described here is far cheaper and simpler than these. The authors do not suggest that they have demonstrated superior clinical outcomes with their device, but their claims to have found a way of reducing variation seem to be substantiated by their data. It may well be that this novel, yet simple, approach has something to offer the wider orthopaedic community.

Internet promotion of direct anterior approach

■ Total hip arthroplasty (THA) is one of the great success stories of the modern medical age in demonstrating excellent long-term outcomes, and has a larger effect size than pretty much any other elective surgical intervention. There are now numerous studies demonstrating exceptional outcomes in the long term but using traditional surgical approaches. With increasing pressures on hospital beds, and healthcare providers focused on cost containment, there has been a drive to reduce patient length of stay without putting these excellent outcomes at risk. The direct anterior approach (DAA) is one such method that is gaining increasing popularity. Protagonists claim this is associated with less muscle damage, less pain, and an accelerated recovery compared with the more traditional surgical approaches. However, despite the surge in popularity of the DAA, there have been a number of studies raising concerns of increased nerve and muscle damage, blood loss, wound problems, femoral fracture, and a steep learning curve associated with significant complications. To date, there are no randomized controlled trials with long-term follow-up comparing the different surgical techniques. Nonetheless, there has been considerable information uploaded online by implant

manufacturers and surgeons alike. In this day and age, patients often go to the internet for medical information and may use this information to influence their choice of implant and surgeon, as well as surgical approach. The authors of this interesting paper decided to evaluate the degree of promotion of the DAA THA on websites associated with members of the American Association of Hip and Knee Surgeons (AAHKS). As well as analyzing the extent of specific claims made regarding the DAA THA risks and benefits, they also looked at what evidence was cited on the websites from peer-reviewed literature. In January 2016, researchers in **Indianapolis, Indiana (USA)** visited 1855 websites, of which 22.8% mentioned the DAA.⁵ In comparison, the anterolateral approach was mentioned on 2.3% of sites, and the posterior approach on 4.7%. While the majority of websites did not suggest that the DAA approach was superior to other approaches, some did. Although the benefits of the DAA were mentioned on most websites, very few mentioned the DAA-specific risks. Of the websites that mentioned the DAA, only 4.7% mentioned the risk of lateral femoral cutaneous nerve injury, 3.1% mentioned femoral or trochanteric fracture, 1.7% mentioned haematoma and wound healing problems, and 0.7% mentioned increased radiation exposure. Very few websites cited peer-reviewed literature relevant to the DAA. As orthopaedic surgeons, we should continuously look for new ways to help improve the outcomes of our patients. However, these changes need to be researched properly and have the best possible evidence available to support them in order to ensure that we are not putting our patients at risk. Many innovations have been introduced over the years, some with considerable success, others sadly not; as a result, patients have suffered. The DAA has been widely marketed and is often used on the websites of orthopaedic surgeons to attract new

patients, particularly in the private sector. In this study from the USA, over one-fifth of AAHKS members promoted the DAA. The information provided on these sites often promised a quicker recovery, improved function, and less pain without reference to any peer-reviewed literature. Such claims may understandably motivate patients to choose surgeons who offer this technique. However, this provides an incomplete picture of the risks and benefits of the technique. There does appear to be some support across the literature that recovery following a DAA is quicker but the technique is associated with some 'approach-specific' complications. In the absence of long-term data and few randomized controlled studies, we must be honest with our patients, particularly in recommending the DAA when the outcomes following more traditional approaches are so good.

The risk of cardiac failure following metal-on-metal hip arthroplasty

■ There has been considerable attention in the medical literature and the national press regarding the complications and high rates of failure of metal-on-metal (MoM) hip bearings. Regulatory alerts, device recalls, and mandatory surveillance programmes have been the more recent actions taken regarding MoM. With the release of particulate debris and metal ions into the circulation, there has been some focus on the systemic effects, such as cardiotoxicity, cancers, and mortality, as well as the local effects. When it comes to the cardiac effects, a recent study has reported a threefold increase in hospital admissions due to cardiac failure in patients with MoM hip arthroplasty. However, to date, the literature has been somewhat inconsistent. The authors of this study from **London (UK)** looked at the relationship between MoM total hip arthroplasty (THA) and increased cardiac failure compared with other types of prosthesis.⁶ Their

study focuses on a retrospective cohort of patients obtained from the UK's National Joint Registry, which included 535 776 patients who underwent a THA and had no previous history of cardiac failure. Of these, a total of 53 529 patients (10%) had a MoM THA. The authors made a direct comparison between the two groups in the first seven years after surgery and demonstrated that there was no association between MoM arthroplasty and an increased incidence of cardiac failure. Indeed, the risk of cardiac failure in the MoM group appeared to be lower than in those with other types of articular bearing surface. These findings persisted after the authors performed extensive adjustments for confounding factors. Interestingly, the authors found that patients with large-head MoM THAs had a similar hazard ratio for cardiac failure to those undergoing non-MoM THAs, whereas patients with a hip resurfacing had a lower hazard ratio for cardiac failure. This is probably not too surprising, as resurfacing is often performed in younger, fitter patients. In addition, the authors looked at prostheses associated with a higher rate of implant failure and found no corresponding increase in cardiac failure. So why the concern about MoM THAs and cardiomyopathy? This stems from historical studies of cobalt cardiomyopathy and beer-drinkers in Quebec, Canada, and case reports of a small number of patients with failed implants with reported cardiomyopathy and very high levels of metal ions. To date, the studies that have reported a link between MoM THAs and cardiomyopathy have been small and therefore susceptible to significant confounding factors that undoubtedly influenced their conclusions. While there remain concerns about MoM bearings in terms of local tissue reactions and implant failure, this large epidemiological study will hopefully reassure patients and physicians alike that, based on current evidence, there is no link between cardiac

failure and MoM bearings in the first seven years after surgery. This covers the period where patients are considered to be most at risk of developing cardiac failure (up to six years) after their surgery.

Perception versus fact in leg-length discrepancy

■ Leg-length discrepancy (LLD) is an important complication following total hip arthroplasty (THA). It is a significant cause of patient dissatisfaction with the requirement for an orthotic, and it is associated with low back pain, hip instability, and, in some patients, revision surgery. For these reasons, it can also be a significant cause for litigation. Leg-length discrepancy can be influenced by modifiable surgical factors such as femoral length and offset, but can also be influenced by the stem design, fixation technique, and length of the prosthetic femoral head. However, the 'functional' length can also be affected by a hip flexion contracture, coronal and sagittal knee alignment, pelvic obliquity, and axial pelvic rotation. The authors of this interesting study from **Paris (France)** looked at whether the patient perception of LLD correlates better with 'functional' length than anatomical length.⁷ This retrospective study of 101 patients all received an uncemented THA for osteoarthritis, 38 through an anterolateral approach, 37 through a posterior approach, and 26 through a direct anterior approach. Following surgery, the patients underwent EOS imaging obtained in a standing position, and these 3D images were compared with the patients' perception of LLD. Factors that were associated included pelvic obliquity, difference in knee sagittal alignment, and the difference in the distance from the middle of the tibial plafond and the ground. There was no correlation between the perception of LLD and anatomical femoral length, anatomical leg length, or functional leg length. Although this study is not without its limitations, including



a qualitative preoperative analysis and its small sample size, it does highlight the complex nature of a perceived LLD. Certainly, surgeons can have some influence by their choice of an uncemented implant. Larger prostheses may seat more prominently than smaller prostheses, resulting in a LLD. In addition, prosthetic femoral heads with a shorter or longer neck can affect the anatomical length as well as the offset. Changing the femoral offset can also influence the perceived LLD by placing more tension on the hip abductors and resulting in a pelvic obliquity. The take-home message here is that patients with a perceived LLD need a very careful review, especially when considering revision surgery for this indication. In this particular study, it was not the anatomical femoral length that correlated with the patients' perception of a LLD, but other variables. Patients need careful assessment prior to their THA to investigate their leg length for spinal deformities, knee alignment, and pelvic obliquity, as well as foot deformities. Patients can then be counselled before their surgery on the implications of these deformities on any perceived postoperative LLD.

Preoperative screening to reduce arthroplasty infection X-ref

■ In the past, anyone with significant degenerative joint disease would undergo a hip or knee arthroplasty, seemingly without any kind of optimization or consideration of the potential risk factors for

complications. As healthcare funding has become more squeezed, we are likely to see more and more focus on results and complications. One potential approach to combat poor results is to screen patients and only offer surgery to those without significant risk factors for complications. This is precisely what a team in **Houston, Texas (USA)** have done.⁸ The paper reports an overall complication rate for both total hip and total knee arthroplasties pre- and post-implementation of guidance. The screening criteria used were haemoglobin (Hb) ≥ 11 , glycated haemoglobin (HbA1c) ≤ 7 , body mass index (BMI) ≤ 35 , and albumin ≥ 3.5 . The authors reported 520 patients prior to, and 475 patients after, the introduction of screening criteria. The groups

were analyzed for complications as their primary endpoint. The authors established that there was a significant benefit in terms of complication rates. For knees, complications were significantly reduced to around half (33% to 15.0%); for hips, the complication rate fell more dramatically still (42.4% to 14.2%). A similar picture was seen with infection rates, with overall surgical site infection rates falling from 4.4% to 1.3%. Although they are significantly reduced in this study, it is important to note that the complication rates initially reported in this series are on the seriously high side, with two in five patients undergoing knee arthroplasty suffering a complication. That said, the effect of the screening programme does seem to have improved the complication rates dramatically.

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Knee

X-ref For other Roundups in this issue that cross-reference with *Knee* see: *Children's orthopaedics Roundup 6; Hip & Pelvis Roundups 1 & 8; Research Roundups 2 & 5.*

Is manipulation under anaesthesia really a solution?

■ A significant number of patients find rehabilitation following total knee arthroplasty (TKA) challenging, with an appreciable proportion of patients developing some stiffness leading to a poor range of movement. We know that a loss of 90° of flexion and fixed flexion deformities lead to poor outcomes and functional impairment associated with significant dissatisfaction. The aetiology of such a complication is multifactorial, including poor pre-operative range of movement, large body habitus, previous knee trauma, and non-compliance with postoperative rehabilitation regimens. But for all of this, even in the best hands with the best postoperative regimes, some patients just get stiff. Intraoperative surgical errors should not,

of course, be overlooked, including inadequate bone resection, failure to balance the flexion and extension gaps, and component malrotation. However, even when a surgically satisfactory TKA has been performed, persistent stiffness may still develop secondary to arthrofibrosis. Despite intensive physiotherapy and continuous passive motion (CPM) devices, some patients still require manipulation under anaesthesia (MUA) to break down some of the fibrous adhesions formed within the knee that limit range of movement. There have been a number of studies published on MUA for stiffness post-TKA but there appears to be little consensus on patient demographics that predict success and when the MUA should be performed. The authors of this study reviewed all of the relevant literature to date in order to arrive at a conclusion to help guide the management of patients with a stiff TKA. This review team from **New York, New York (USA)** undertook a review of 22 papers reporting the outcomes of 1488

patients in an attempt to identify the expected outcomes and predictors (if any) of success.¹ In this series, the mean time between TKA and MUA was 9.9 weeks (2 to 22) and there was a significant improvement in flexion, on average, following MUA in all studies. There was an overall complication rate of less than 1% associated with MUA. Complications included supracondylar fractures, haemarthrosis, wound dehiscence, and deep vein thrombosis. Four studies reported on the outcomes of repeat MUAs, with the majority reporting an improvement in the range of movement but an increased risk of complication. The authors concluded that the current literature supports intensive physical therapy, and CPM with MUA reserved for those patients who fail to improve with more conservative measures. With similar failure rates for MUA reported at different times from the index operation, the authors suggested that it is safe to allow a longer trial of conservative management for patients who are keen to avoid

a MUA. However, this also assumes that there is easy access to 'aggressive' physiotherapy, which is not always the case in the outpatient setting. This may lead to patients being admitted for an earlier intervention due to the lack of outpatient physiotherapy services. The authors did add that, although there was no clear benefit to performing a MUA within 30 days of TKA, there is an added benefit when it is done within the first 12 weeks. On the whole, patients find TKA much more painful than total hip arthroplasty (THA), which directly affects their compliance with postoperative rehabilitation. More studies are needed to understand better the causes of this increased pain and how best to address it. This would hopefully see a reduction in those patients needing a MUA post-TKA.

Exercise in patients living with knee osteoarthritis

■ Knee osteoarthritis (OA) is common and is responsible not only for pain, but also for functional