

ROUNDUP360

Hip & Pelvis

X-ref For other Roundups in this issue that cross-reference with *Hip & Pelvis* see: *Knee Roundup 4*; *Trauma Roundup 7*; *Research Roundups 1 & 2*.

Minimally invasive surgery for hip arthroplasty?

■ The vast majority of work comparing surgical approaches for total hip arthroplasty (THA) to date has focused on early outcomes and rates of functional recovery. There is little published evidence to support implant survivorship data, and there are plausible arguments on both sides of the debate. Although minimal soft-tissue disruption may give better functional results, there is an incidence of periprosthetic fracture and component malalignment seen with minimally invasive approaches. This gap in the literature is easily explained – until relatively recently, minimally invasive hip surgery was not undertaken in sufficient numbers to allow data comparison. This is starting to change, however, and this well written paper from **Bergen (Norway)** uses the venerable and long-established Norwegian Arthroplasty Register as the basis of this study.¹ The authors set out to compare survivorship data at two and five years (median follow-up 4.3 years) between minimally invasive anterior/anterolateral *versus* direct natural *versus* posterior approaches, in all patients included in the registry from 2008 to 2013. Outcomes were assessed for survival estimates using Kaplan-Meier survival analysis (appropriately adjusted for key demographic variables) and, in addition, the authors calculated

the relative risk of the different approaches using a Cox regression analysis. The direct lateral approach was used as the baseline, against which either minimally invasive surgery (MIS) or the posterior approach were compared. The take home message from this study was that none of the measures demonstrated any difference in revision rates between the groups. The authors broke down the revision rates into two- and five-year relative risks of revision, and undertook analysis by infection, dislocation and all-cause revision. The analysis uses the reported outcomes of 21 860 THAs undertaken with an uncemented stem between 2008 and 2013. The joint arthroplasties were undertaken through a variety of approaches: MIS anterior (n = 2017); MIS anterolateral (n = 2087); posterior approach (n = 5961); and the majority through a direct lateral approach (n = 11 795). Interestingly, even when the first 50 MIS procedures for each hospital were excluded (much has been written about the long dissipated learning curve, with the direct anterior approach in particular), revision rates remained unchanged. The authors acknowledge the potential weaknesses of a registry-based study and recognise that, by grouping together direct anterior and MIS anterolateral cohorts (which they justify by the need for a statistically sufficiently large number), the strength of that message is slightly diluted. Nevertheless, the large numbers (21 860 hips in total) and robust statistical methodology certainly support

the straightforward take home message of this paper that, at least in the mid-term, minimally invasive approaches to the hip do not appear to increase revision rates. This study does not aim to demonstrate that minimally invasive surgery is in any way superior to lateral or posterior approaches, but it certainly lends support to surgeons who are choosing to adopt this approach, often still in the face of a degree of scepticism from colleagues.

Bone marrow aspirate for AVN of the femoral head?

■ Avascular necrosis (AVN), either spontaneous or otherwise, can be a somewhat tricky diagnosis to treat. The patients are rarely old enough to jump straight to a primary total hip arthroplasty (THA) and, as such, the surgeon is left with a difficult set of decisions to make. Surgical approaches such as core decompression, vascularised fibular grafting and even osteotomy have been advocated. However, most have a somewhat dubious track record and run the risk of complicating any subsequent surgery. This group of surgeons in **Tsukuba (Japan)** the report on the results of their potentially attractive and previously described approach, processing bone marrow aspirated from the iliac crest, which is then centrifuged before being re-introduced into areas of necrosis within the femoral head.² In the current report, the authors examine the efficacy of this approach with a cohort of patients with unilateral symptomatic AVN and contralateral MRI-proven asymptomatic

disease. This paper concerns the treatment of the asymptomatic hip, which, if left alone, one might surmise would convert to symptomatic AVN. The authors were able to describe the outcomes of 31 such patients in whom this technique was undertaken, and followed the patients for a minimum of two years. Both radiological and clinical outcomes are presented in this paper. As this is one of the largest series of studies on AVN in the literature, the authors subdivided the cohort depending on severity of radiological AVN at the time of treatment. The authors present clinical outcomes as the Japanese Orthopaedic Association (JOA) score (containing both subjective and objective components), radiological evidence of femoral head collapse, or conversion to THA. The thrust of this paper is that their concentrated autologous bone marrow aspirate transplantation (CABMAT) approach gave better activities of daily living (ADL) and JOA scores at follow-up than pre-operatively. Although this was not statistically significant overall, there were significant improvements in some subscales of the JOA. The results presented here, when compared against other published series, appear to support the CABMAT approach due to lower reported rates of femoral head collapse than those previously reported for patients who were managed non-operatively, and lower reported rates than in series describing the results of core decompression without CABMAT. This study has its methodological flaws,

namely its retrospective nature, small sample size, lack of control groups and choice of studies against which the data are compared (which are of varying design and methodology). Nevertheless, the paper contains enough data to support the use of this technique, and to suggest that it may be of sufficient value to justify further evaluation in this patient group.

Low-molecular-weight heparin and bleeding following TJA

■ Thromboprophylaxis is currently one of the thorniest topics in orthopaedic surgery. The issue has resulted in questions in the UK Parliament, lobbying in the US Congress, and even television campaigns and charities dedicated to ‘stopping the clot’. Why then, given the political pressure, do orthopaedic surgeons continue to be obstinate? Is it plain stubbornness, or does evidence suggest that thromboprophylaxis may have some drawbacks? Although numerous previous systematic reviews and meta-analyses have been published on the subject of thromboprophylaxis following total hip arthroplasty (THA), these authors from **Victoria (Australia)** are correct to state in their opening gambit that relatively little work to date has focused specifically on the risk of bleeding complications – clearly itself a significant risk factor for post-operative deep periprosthetic infection.³ Using standard Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology, the authors searched for all papers in the indexed literature on this topic between 1990 and 2015. They were able to include a total of 45 randomised controlled trials (RCTs) reporting the outcomes of 56 730 patients. The antithrombotic agents reported in these studies included enoxaparin, dabigatran, apixaban and rivaroxaban. These agents were variously compared against heparin, aspirin, warfarin or no pharmacological

thromboprophylaxis. In terms of efficiency against prothrombotic events, apixaban and rivaroxaban showed the lowest pooled deep vein thrombosis (DVT) rates. However, there was no significant difference in incidence of pulmonary embolism (PE) between any of the agents. The focus of this study was on post-operative bleeding complications and there were some striking variations here between the different agents. Those patients treated with low-molecular-weight heparin (LMWH) had a significantly higher relative risk (RR) of wound bleeding than either the control (RR 2.32) or warfarin (RR 1.54). Although apixaban was found to be more effective than LMWH in preventing DVT, this did not go hand in hand with a trend towards a decrease in major, clinically relevant and surgical site-related bleeding. Dabigatran was similarly effective to LMWH, with a similar risk of major and clinically relevant bleeding episodes, but it was associated with a decreased risk of surgical site bleeding. Rivaroxaban also demonstrated an increase in major and clinically relevant bleeding episodes compared with LMWH, although surgical site bleeding was similar between rivaroxaban and LMWH. There is at present much “word of mouth” and anecdotal evidence to suggest that the oral anticoagulants, in particular, are associated with higher rates of post-operative wound bleeding complications. This methodologically sound meta-analysis would appear to support this.

Direct anterior approach for obese hips?

■ The direct anterior approach (DAA) has been garnering some interest among the hip fraternity of late. With more and more surgeons buying into the muscle-sparing minimally invasive mantra, we were interested to see this paper from **Miami, Florida (USA)**, which asks the question: can the DAA be used to any effect in obese patients?⁴ The difficulties of accurate component position

in total hip arthroplasty (THA) in the obese have been reported by numerous authors, and the body habitus increases the likelihood of inaccurate acetabular component positioning, accounting at least in part for the higher dislocation rate following THA. One of the key perceived benefits of the direct anterior approach to hip replacement, as advocated by its proponents, is the potential improvement in acetabular component positioning due to the use of intra-operative fluoroscopy. These authors seek to determine whether the DAA and obese patients could be a marriage made in heaven or whether we are just overcomplicating something that is already rather complex. This paper comprises a retrospective review of prospectively collected data, with the authors evaluating the immediate post-operative radiographs of 1599 consecutive THAs undertaken through the DAA. The aim of this study was to assess whether either obesity or morbid obesity (506 and 28 patients, respectively, in each subgroup) was associated with less accurate component positioning. The take home message is that the authors found no statistical significance, concluding that the DAA allows reproducible component positioning, even in overweight patients. The discussion acknowledges the limitations imposed by relatively small numbers in the obese, and particularly morbidly obese, cohorts. It also acknowledges the absence of clinical data on outcomes. The authors note, too, that not all of the small number of other studies on this topic have shared this conclusion. With no direct comparison of obese or morbidly obese patients operated with a different approach, it is rather difficult to draw any firm conclusions about the potential benefits of the DAA when compared with other approaches. Nevertheless, critics of the DAA would do well to consider the findings of this paper, which certainly suggest that this represents



a potential advantage over other approaches in this ever-increasing patient cohort.

Metallosis from other articulations?

■ To date, much work has focused on patients undergoing revision surgery for adverse reaction to metal debris (ARMD) following primary total hip arthroplasty with metal-on-metal bearing (MoM). One of the unanswered questions surrounding the MoM and adverse metal reactions concerns those patients suffering from metallosis who do not have a MoM bearing, i.e. those with either trunnionosis or some form of modular stem. It is known that the abraded wear debris from a non-articulating surface such as a Morse taper can cause metallosis. What is not clear, however, is how many of these patients there are, or even what their outcomes are. This is an interesting registry-based paper from **Oxford (UK)** examining the outcomes of a small subset of hip revisions – a subset that, as the authors themselves point out, will potentially increase.⁵ The authors designed a study based around the UK National Joint Registry (NJR). They were able to identify 185 patients within the UK NJR itself, between June 2008 and December 2015, who underwent revision specifically recorded as being for ARMD but whose primary articulating bearing was not MoM. Outcomes were assessed using the comparatively blunt tool of second revision. However, even with the relatively sparse NJR data available, the authors

were able to identify a number of predictors of poor outcome (i.e. early further revision). These included another indication for revision concomitant to ARMD (e.g. instability), selective component revision (i.e. some components not revised), and ceramic-on-polyethylene bearing use at the time of first revision. While registry papers have recognised drawbacks, the authors are correct in their assertion that this is probably the most effective means of capturing a reasonable cohort of patients with what is essentially still a rather unusual diagnosis. Certainly, this is likely to represent an ongoing clinical issue, and the findings of this study should be considered in both pre-operative counselling and intra-operative selection of technique/articulation when undertaking revision hip surgery in this particular context.

Direct anterior approach: the state of play

■ Much has been written about the direct anterior approach (DAA) to the hip in recent orthopaedic literature, and we were delighted here at 360 to come across this review from **London (UK)** of all the relevant current literature.⁶ The DAA is still in the minority in England, Wales and Northern Ireland, with the joint registry suggesting most use a posterior approach (59%), some 35% use the lateral or Hardinge approach, and < 1% of surgeries are performed with either an anterior or an anterolateral approach. However, enthusiasts of the DAA allege a reduced risk of dislocation, faster recovery, less pain, a smaller incision and fewer surgical complications. Claims, however, are not always supported by evidence, and the authors of this review suggest that currently there is insufficient evidence that it conveys a significant advantage over other techniques. In terms of surgical incision, there are several papers that claim the DAA enables a shorter incision; however, those patients who had a posterior approach also had a higher body mass index (BMI),

necessitating a larger incision. It could also be argued that the length of the skin incision is a poor marker for soft-tissue trauma and that shorter incisions may be associated with more underlying soft-tissue trauma. Most studies appear to show that the direct anterior approach is associated with a longer operating time. This may be due to the inclusion of the surgeon's learning curve for the anterior approach, and data comparing blood loss were inconclusive. Much has also been made of the potential for improvements in length of stay following the DAA, with proponents arguing that the relatively 'muscle-sparing' approach reduces post-operative pain, thereby enabling early discharge. There were 12 studies included in this review and there was little evidence to suggest that the approach made any difference to the length of stay. From the papers that the authors reviewed, some of which included analysis of the post-operative recovery and gait analysis, it was difficult to make any useful conclusions as there were many confounding variables. At present, there are not enough high-quality papers that support the widespread use of the DAA. There have been numerous papers highlighting the learning curve associated with this technique and the complications associated with this learning curve. The authors argue that it would be difficult to justify, based on the current best evidence, the widespread adoption of this technique when outcomes following THA using more traditional surgical approaches are so good.

Reducing the number of unnecessary echocardiograms before hip fracture surgery **X-ref**

■ Evidence-based medicine is not just about generating the evidence in the form of randomised controlled trials to inform practice – it only starts there. Once the evidence has been generated, disseminating it and changing actual practice is often an uphill struggle.

Of the many barriers to clinical practice change, perhaps the most infuriating one is that of routine; clinicians are often creatures of habit and 'playing safe' or doing 'what we've always done' can be surprisingly strong arguments in clinicians' minds, even when expensive interventions are involved. Nowadays, reducing medical cost is required not only by patients but also by insurers and wider society. The clinical questions proposed by these authors from **Charlotte, North Carolina (USA)** are timely given the current financial pressure on health care.⁷ This retrospective review reported the outcomes of 100 patients, all of whom underwent an echocardiogram as part of their peri-operative work-up. The authors then undertook a notes review and audited the requests against the American College of Cardiology/American Heart Association clinical guidelines. These authors report that only in two thirds of cases was the request in line with current guidelines, and that just 14% of patients had an echocardiogram result that would have changed anaesthetic practice. They went on to perform a sensitivity and specificity analysis of the guidelines themselves and essentially established that there is little potential to miss investigations that could be important, as the guidelines were 100% sensitive, although just 40% specific. Had the guidance been properly followed in this cohort, 34% of echocardiograms could have been avoided. This would not only reduce costs but would also free up capacity in often stretched centres caring for elderly trauma patients.

NSAIDs in hip and knee arthritis pain **X-ref**

■ A difficulty we all face when interpreting data for common conditions is putting the large amount of data produced into a single meaningful and clinically relevant message. One way of doing this is meta-analysis; we have all come to

rely on sources, such as the reviews produced by the Cochrane Collaboration, to answer these questions. Meta-analysis does, however, have its drawbacks. Comparisons are only easily drawn when studies have similar designs and report similar outcomes, and when just two interventions are considered. The network meta-analysis method, which uses multiple comparisons, is much more complex to perform but easy to understand. In short, if one study is reported A versus B and another study is reported B versus C, then it is possible to use network meta-analysis to work out A versus C. This review team from **Bern (Switzerland)** have applied this method to studies considering the treatment of hip and knee arthritis with analgesia. Given the simplicity of the topic, it is surprising that nobody has conducted this sort of analysis before, and that the results are genuinely interesting enough to warrant publication in the *Lancet*.⁸ These authors included studies reporting the effectiveness of non-steroidal anti-inflammatory drugs (NSAIDs), paracetamol or placebo for the treatment of osteoarthritis pain. They included 76 randomised trials, presenting the data for 58 451 patients from a potential 8973 manuscripts initially identified in the search with outcomes of both pain and physical function. Perhaps reassuringly, all of the tested interventions were effective at reducing pain levels; however, only three of the analgesics (diclofenac, etoricoxib, and rofecoxib) appeared to show efficacy at or above the minimal clinically important difference with at least 95% certainty. Specifically, this study would suggest that paracetamol as a sole agent is of little use in the management of long-term arthritis pain, and that diclofenac was the most effective analgesic in this study.

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Knee

X-ref For other Roundups in this issue that cross-reference with *Knee* see: *Hip Roundup 8; Research Roundups 2 & 3.*

Re-admission following total knee arthroplasty: are complications to blame?

■ In these days of bundled payments and financial penalties for re-admissions, with some health-care systems imposing enforced financial implications on hospitals and surgeons where patients are re-admitted within a fixed time period, the surgeon now faces dual burdens. On the one hand, there is significant pressure to reduce hospital admissions and length of stay, and, on the other, there are penalties if the patients are re-admitted (higher re-admission rates seem almost inevitable with day-case or 24-hour stay arthroplasty). Surgeons in the Hospital for Special Surgery in **New York, New York (USA)** are taking a look at the somewhat contentious issue of re-admission after surgery for total knee arthroplasty (TKA).¹ Aiming to clarify what the causes and risk factors are after surgery, they used the Statewide Planning and Research Cooperative System (SPARCS) database from the New York State Department of Health to identify 377 705 patients, all of whom had undergone TKA between 1997 and 2014 in New York State. In total, there were 22 076 re-admissions within 30 days: an overall incidence of 5.8%.

The authors extracted the ID-9 codes for re-admission and attributed them as due to complications as a result of the primary procedure (ICD-9 attributable and a wider definition agreed by expert opinion) or unrelated. The authors then undertook a multivariable analysis to examine the incidence, causation and predisposing factors for re-admission following surgery for a TKA. There were differing rates of re-admission between units included in the study, with a median rate of 3.9%. Using the two criteria defined in the study, 11% were ICD-9 attributable to the knee arthroplasty, and 31% were potentially attributable on the expanded expert list. The authors identified older age (> 85 years, odds ratio (OR) = 1.32), male gender (OR = 1.41), Medicaid coverage (OR = 1.40), and various comorbidities as increasing risk factors for knee-related re-admissions. However, although smaller units had a higher re-admission rate, this was not specific to knee-related complications and appeared to be important in units operating on < 90 patients per year. The key take home point of this study is that re-admission for any cause after TKA is much higher than for total knee-specific causes. With this being the case, orthopaedic surgeons and their units should not be punished for every hospital re-admission after surgery. Hospital administrators and healthcare funders should recognise and make the distinction

between separate re-admissions that should not be bundled with the index procedure payment, if the complications are different and not related to the index surgery.

Total knee constraint and surgical technique: any effect on survival?

■ Constraint and ligament substitution is an interesting area in total knee arthroplasty (TKA), and there are certainly a number of differing philosophies as to what is best. At one end of the spectrum, there are some surgeons who will undertake rotating hinge knee arthroplasties, even as a primary procedure. On the other, there are those who will do their utmost to retain the ligaments, and preferentially insert posterior cruciate ligament (PCL)-retaining implants – even into valgus knees, which potentially require more constraint. These authors from **Adelaide (Australia)** reason that there are potentially two types of surgeons: those who always undertake posterior-stabilised implants; and those who use cruciate-retaining knees where possible (sometimes known as kinematic and minimally stabilised, respectively).² The authors sought to take advantage of these preferences to test the assertion that kinematic knee arthroplasty survival is poorer due to case selection, as those with a preference for minimal stability will undertake kinematic knees in more

complex cases. The authors constructed a form of intention-to-treat analysis using the apparent surgical preferences from the Australian Joint Registry. They then went on to compare outcomes between posterior-stabilised and cruciate-retaining TKAs. The study showed interesting results in a large patient population. However, it is important to recognise the drawbacks in this method, in that by comparing surgeons who used one prosthesis exclusively, the study is really a comparison of surgical philosophy and technique as opposed to a comparison of implants. The primary outcome of this study was the hazard ratio (HR) for revision, which was calculated using cumulative percentage revision. The data set follows patients for up to 13 years, where the cumulative percentage revision was 5.0% (95% CI 4.0% to 6.0%) versus 6.0% (95% CI 4.2% to 8.5%) for surgeons who preferred minimally stabilised versus posterior-stabilised, respectively. Therefore, there were no overall significant differences in the cumulative percentage revision rates between the groups. Slightly confusingly, however, the hazard ratios were significantly different for all causes (HR 1.45, 95% CI 1.30 to 1.63), for loosening or lysis (HR 1.93, 95% CI 1.58 to 2.37), and for infection (HR 1.51, 95% CI 1.25 to 1.82). Further studies using prospective randomised cohorts are clearly needed here to determine